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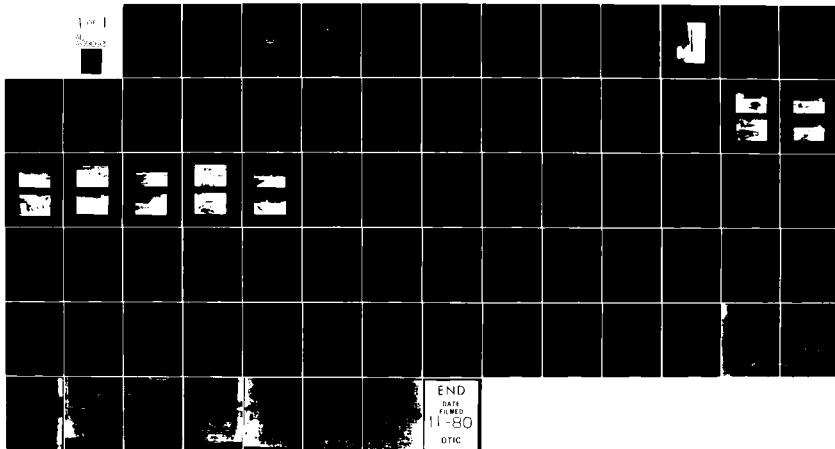
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13  
NATIONAL DAM SAFETY PROGRAM. LOCK 2 DAM AT MECHANICVILLE (I.D. ---)  
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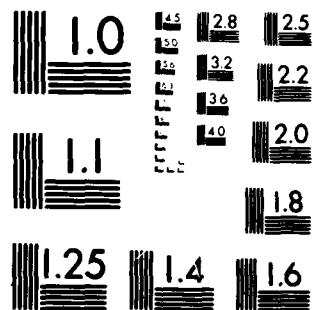
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety National Dam Safety Program Visual Inspection Hydrology, Structural Stability		Mechanicville Rensselaer County Saratoga County Hudson River
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.  Examination of available documents and a visual inspection of the dam revealed several deficiencies which may affect the safety of the dam. There was serious leakage in the vicinity of one of the gates in the gatehouse section. The auxiliary spillway section had failed allowing a portion of the		

river to flow around the left end of the dam.

In addition to these observed deficiencies, structural stability analyses performed for the main spillway section indicate that the structure is unstable when subjected to severe loading conditions such as ice loading or flood flows. Further analysis is required. These studies should include subsurface and structural investigations to obtain information about the condition of the structure and its foundation. This information should then be incorporated into a more detailed stability analysis.

The spillway, not having sufficient discharge capacity for passing one-half the Probable Maximum Flood (PMF), is considered to be inadequate. For such a large storm event, a high tailwater condition would occur, resulting in the flooding of downstream hazard areas. Hence, dam failure from overtopping would not significantly increase the hazard to loss of life from that which would exist just before failure.

Several other deficiencies were also noted on this structure. Among these were deteriorated concrete on the main spillway section, erosion at the east abutment, and minor sloughing at the west abutment. In addition, no emergency action plan exists for this structure.

The investigations into repairing the leak in the gatehouse and reconstructing the failed auxiliary spillway section as well as the evaluation of the structural stability should be commenced within 3 months of the date of notification of the owner. Remedial work deemed necessary as a result of these investigations should be completed within 18 months. Other deficiencies should be corrected within 12 months of the date of notification.

**UPPER HUDSON RIVER BASIN  
LOCK 2 DAM AT MECHANICVILLE**

**RENSSELAER & SARATOGA COUNTIES, NEW YORK  
INVENTORY NO. N.Y. 988**

**PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM**



**NEW YORK DISTRICT CORPS OF ENGINEERS  
SEPTEMBER 1980**

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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 NATIONAL DAM SAFETY PROGRAM  
 LOCK 2 DAM AT MECHANICVILLE  
 (I.D. NY 988)  
 UPPER HUDSON RIVER BASIN  
 RENSSELAER-SARATOGA COUNTY, NEW YORK  
 Phase I Inspection Report.  
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**PHASE I REPORT  
NATIONAL DAM SAFETY PROGRAM**

Name of Dam: Lock 2 Dam at Mechanicville  
I.D. No. NY 988

State Located: New York

County: Rensselaer-Saratoga

Watershed: Upper Hudson River Basin

Stream: Hudson River

Date of Inspection: August 13, 1980

**ASSESSMENT**

Examination of available documents and a visual inspection of the dam revealed several deficiencies which may affect the safety of the dam. There was serious leakage in the vicinity of one of the gates in the gatehouse section. The auxiliary spillway section had failed allowing a portion of the river to flow around the left end of the dam.

In addition to these observed deficiencies, structural stability analyses performed for the main spillway section indicate that the structure is unstable when subjected to severe loading conditions such as ice loading or flood flows. Further analysis is required. These studies should include subsurface and structural investigations to obtain information about the condition of the structure and its foundation. This information should then be incorporated into a more detailed stability analysis.

The spillway, not having sufficient discharge capacity for passing one-half the Probable Maximum Flood (PMF), is considered to be inadequate. For such a large storm event, a high tailwater condition would occur, resulting in the flooding of downstream hazard areas. Hence, dam failure from overtopping would not significantly increase the hazard to loss of life from that which would exist just before failure.

Several other deficiencies were also noted on this structure. Among these were deteriorated concrete on the main spillway section, erosion at the east abutment, and minor sloughing at the west abutment. In addition, no emergency action plan exists for this structure.

The investigations into repairing the leak in the gatehouse and reconstructing the failed auxiliary spillway section as well as the evaluation of the structural stability should be commenced within 3 months of the date of notification of the owner. Remedial work deemed necessary as a result of these investigations should be completed within 18 months. Other deficiencies should be corrected within 12 months of the date of notification.

- j -

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Approved By:

*W. M. Smith Jr.*

Colonel W. M. Smith Jr.  
New York District Engineer

Date:

*30 SEP 80*



OVERVIEW  
LOCK 2 DAM AT MECHANICVILLE  
I.D. No. NY 988

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
LOCK 2 DAM AT MECHANICVILLE  
I.D. No. NY 988  
(#225A-102)  
UPPER HUDSON RIVER BASIN  
RENSSELAER-SARATOGA COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam

The Lock 2 Dam at Mechanicville is a run-of-river concrete gravity dam with a main overflow section which extends approximately 700 feet across the Hudson River. At the eastern end of the dam, there was an auxiliary spillway section which was 143 feet long. There is a 120 foot long concrete section at the western end of the structure which contains 12 inoperable gates.

Lock 2 of the Champlain Canal was located adjacent to the western end of the dam. A hydroelectric generating station operated by the Niagara Mohawk Power Corporation was located to the west of the navigation lock.

b. Location

The dam is located on the Hudson River, southeast of the City of Mechanicville. The dam is to the east of Routes 4 and 32.

c. Size Classification

This dam is 23.5 feet high and impounds a reservoir of 2716 acre-feet. It is classified in the intermediate size category as defined by the "Recommended Guidelines for the Safety Inspection of Dams."

d. Hazard Classification

The dam is classified as a "high" hazard structure because of a number of homes located along the banks of the Hudson River downstream of the dam and because of the high economic losses to the barge canal and the power station which would occur if the dam failed.

e. Ownership

The Lock 2 Dam is owned by the State of New York - Department of Transportation (NYS-DOT), Waterways Maintenance Subdivision. It is located in DOT-Region 1, whose headquarters are in Albany, New York. The hydroelectric power station at the western end of the dam is owned and operated by the Niagara Mohawk Power Corporation.

The addresses of the Main Office and Regional Office of DOT are as follows:

New York State DOT  
Main Office-State Campus  
1220 Washington Avenue  
Albany, New York 12232  
Mr. Joseph Stellato  
Director  
(518)457-4420

New York State DOT  
Region 1 Office  
84 Holland Avenue  
Albany, New York 12208  
Mr. John Hulchanski  
Waterways Maintenance Engineer  
(518)474-6715

f. Purpose of Dam

The primary purpose of this dam is for navigation on the Champlain Barge Canal. The impounded waters form a storage pool for Lock No. 2. A supplementary purpose of the dam is to provide a reservoir for hydroelectric generation at the power station.

g. Design and Construction History

Records indicate that this dam was built about 1899. The crest of the spillway section was replaced in 1904 by the Hudson River Power Transmission Company who were the owners of the dam at that time. The Adirondack Electric Power Corporation purchased the dam around 1910. Several years later, the dam was appropriated by the New York State Department of Public Works (NYS-DOT's predecessor) for the Champlain Canal. Lock C-2 was built in about 1915 as part of the construction of the canal. Some modifications to the dam have been made in the time that DOT has owned the dam. No plans or detailed records of these modifications were available. The spillway was recapped and steel sheet piling was driven along the upstream face in the late Forties. The gate house at the western end of the dam was demolished and the gates were sealed in the mid-Sixties.

h. Normal Operating Procedures

Water flows over the ungated spillway. Flow diversions from the pool occur through the intakes of the Lock during boat passage and through the Niagara Mohawk powerhouse.

**1.3 PERTINENT DATA**

<u>a. Drainage Area (square miles)</u>	4570
<u>b. Discharge at Dam</u>	(cfs)
Top of Lock 2	61,408
<u>c. Elevations (Barge Canal Datum-BCD)</u>	
Top of Lock 2	56.5
Spillway Crest	48.0
Reservoir Pool	48.0
Reservoir Pool (USGS Datum)	47.0

<u>d. Reservoir</u>	Surface Area (acres)
Top of Lock 2	385
Spillway Crest	286

<u>e. Storage Capacity (acre-feet)</u>	
Top of Lock 2	2716
Spillway Crest	1146

f. Dam  
 (1) Spillway section  
 Type: Reinforced concrete with concrete apron and vertical steel sheet pile wall on upstream face.

Length (ft):	700
Height (ft):	15

(2) Auxiliary Spillway (Failed section)  
 Type: Reinforced concrete overflow section-originally 2 feet above spillway crest. Now, segments of the concrete are in downstream channel.

Length (ft):	143
--------------	-----

(3) Gatehouse section  
 Type: Concrete foundation of former gatehouse; Contains 12 bays each with a gate that has been sealed

Length (ft):	117
--------------	-----

h. Reservoir Drain  
 None

i. Appurtenant Structures

(1) Lock 2  
 Concrete lock on Champlain Canal; Lock is 350 feet long, 45 feet wide (along axis of dam) and 40 feet deep.

(2) Power station:  
 Power. house operated by Niagara Mohawk Power Corp.

Length (ft):	270
--------------	-----

## **SECTION 2: ENGINEERING DATA**

### **2.1 GEOTECHNICAL DATA**

#### **a. Geology**

The Lock 2 Dam is located in the Hudson Valley Lowlands physiographic province of New York State. Rock in this area was formed during the Cambrian and Ordovician periods. Intricately folded and faulted shale, sandstone and slate are the predominant rock types in this area. There are extensive outcrops of highly weathered shale in the vicinity of the dam. The present surficial soils have resulted primarily from glaciations during the Cenozoic Era; the last of which was the Wisconsin glaciation.

#### **b. Subsurface Investigations**

No records of any subsurface investigations performed for this structure could be located. Based on the information which was available, it appears that the dam was founded on shale.

### **2.2 DESIGN AND CONSTRUCTION RECORDS**

No information was available concerning the design or construction of this dam. A plan concerning the 1904 reconstruction of the spillway section was available. A complete set of construction plans for the lock was available at the Main Office of DOT. No plans were available concerning the other modifications which have been made to this structure.

### **2.3 OPERATION RECORDS**

The dam is visually inspected on an irregular basis by engineers from NYS-DOT. Mean daily water levels are recorded at locations both upstream and downstream of the lock. These records are on file at the NYS-DOT Region One Waterways Office.

### **2.4 EVALUATION OF DATA**

The data presented in this report was obtained from the files of the Department of Environmental Conservation and NYS-DOT. Information concerning the dam and its foundation was very limited. The dimensions of the main spillway section shown on the plans did not agree with measurements made during the inspection. In general the information appeared to be adequate for Phase I inspection purposes.

### SECTION 3: VISUAL INSPECTION

#### 3.1 FINDINGS

##### a. General

Visual inspection of the Lock 2 Dam at Mechanicville and the surrounding area was conducted on August 13, 1980. The weather was partly cloudy and the temperature was in the seventies. Depth of flow over the spillway crest at the time of the inspection was less than one foot.

##### b. Dam-Spillway

The spillway which forms the main portion of the dam could not be observed in great detail because of submergence. Some deterioration of the concrete on the spillway was evidenced by turbulence in the flow or "rooster tails" in several locations. The worst of these irregularities in flow were in two locations at the eastern end of the spillway. There appeared to have been significant concrete removal in these areas. There were also several of these "rooster tails" noted on the apron approximately one-third of the way out from the eastern end of the spillway.

##### c. Gatehouse Section

The section at the west end of the dam where the gatehouse once stood was in need of repair. The twelve gates had been sealed when the gatehouse was demolished in the midsixties. Dredge material was dumped upstream of the gatehouse to further reduce flow through the gates. At the time of the inspection, there was a substantial flow coming through the fourth bary from the eastern end of the gatehouse (see photo in Appendix A). The magnitude of this flow was great enough to have scoured the concrete separating the bays and allow some of the flow to pass into the fifth bay. There was minor leakage noted emerging from all of the other bays as well.

The concrete on this section of the dam was spalled, cracked and deteriorated. There were numerous cracks in the concrete in the vicinity of the anchor bolts which had supported the gate control mechanism. The surface of the concrete on the upstream face was deteriorated both above and just below the waterline. There was significant erosion of the concrete on the wall separating the seventh and eighth bays of the gate outlets (see photos). Trees and brush growing on the downstream face should be removed.

The western end of the gatehouse tied into the natural ground at the west abutment. The slope downstream of the gate house consisted of some fill over partially decomposed shale. There was surface erosion and some minor sloughing on this slope.

##### d. Auxiliary Spillway

There was originally a concrete auxiliary spillway at the eastern end of the dam. The crest of this section was two feet above the crest of the main spillway. This entire section failed in 1978. Several large segments which had broken off the spillway were in the channel downstream of their original location. A wall which had deflected flow away from the east abutment had also failed. This had caused a substantial amount of erosion of earth from the eastern abutment (see photo).

e. Reservoir

The reservoir for this dam is a segment of the Hudson River. At the western end of the dam, there is a swampy area and the river channel is not clearly defined in this area. On the eastern side, the bank of the channel is more well defined.

f. Appurtenant Structures

1. Lock C-2

The navigation lock was in satisfactory condition. No major deficiencies were noted on the canal walls or the gate mechanisms.

2. Niagara Mohawk power station

The power station at the far western end of the dam was not inspected in great detail. However, the station was operational and appeared to be in satisfactory condition.

3.2 EVALUATION OF OBSERVATIONS

Visual inspection revealed several deficiencies on this structure. The following items were noted:

1. The auxiliary spillway section at the eastern end of the dam had failed. This was permitting concentrated flow around this end of the dam and had caused substantial erosion at the east abutment.
2. A large volume of water was flowing through one of the bays of the gatehouse.
3. There was substantial deterioration of concrete on the gatehouse section. Trees and brush growing on the downstream face were contributing to this deterioration.
4. Deteriorated concrete on the main spillway sections was evidenced by irregularities in flow in several locations.
5. There was some minor sloughing and surface erosion at the contact between the gatehouse and the west abutment.

## **SECTION 4: OPERATION AND MAINTENANCE PROCEDURES**

### **4.1 PROCEDURES**

The normal water surface is at or slightly above the uncontrolled spillway crest. Flow diversions occur through the Niagara Mohawk power station and through the navigation lock. The navigation season extends from April to December.

### **4.2 MAINTENANCE OF DAM AND APPURTENANT STRUCTURES**

The dam is maintained by NYS-DOT. Some minor maintenance is performed as needed. Overall maintenance efforts have been deficient resulting in many items which now need to be repaired. The lock has been satisfactorily maintained by DOT. Niagara Mohawk maintains the power house.

### **4.3 WARNING SYSTEM IN EFFECT**

No apparent warning system is present.

### **4.4 EVALUATION**

The operation procedures for this dam are satisfactory. Maintenance procedures are deficient as evidenced by the problem areas listed in section 3.2.

## SECTION 5: HYDROLOGIC/HYDRAULIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map titled "Drainage Area - Lock 2 @ Mechanicville" (Appendix C). With the drainage area encompassing some 4570 square miles including portions of Vermont and Massachusetts, the Hudson River main stem travels approximately 140 miles from its headquarters south of Lake Placid to the Lock 2 Dam. Major tributaries to the Hudson River are the Cedar, Indian, Boreas, Schroon, Sacandaga, and Hoosic Rivers and the Batten Kill. Numerous lakes including Brant, Schroon, Piseco and Saratoga lie within the basin as well as three major reservoirs; Indian Lake, the Tomhannock, and the Sacandaga Reservoir. Approximately one-half to two-thirds of the basin lies within the Adirondack Mountain area where elevations rise to +5344 at Mount Marcy. Elevations at the east abutment of the dam are near +48. Developed land use has occurred in the lower portion of the basin; the larger developments being the municipalities of Warrensburg, Glens Falls, Hudson Falls, Saratoga Springs; Arlington, Vermont; Greenwich, Schuylerville, Cambridge; Bennington, Vermont; Adams, North Adams, and Williamstown, Massachusetts; and Hoosick Falls.

### 5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam was performed using streamflow gaging station records (Appendix C) and data contained in a Corps of Engineer report entitled "Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models." The methodology described in this report employed the Corps of Engineers HEC-1 computer program in developing a model that correlated well with past known major storm events; i.e., the storms of October, 1945, December, 1948 and June, 1972. No direct computer analysis using HEC-1 was performed. The spillway design flood selected for analysis was the PMF in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

### 5.3 SPILLWAY CAPACITY

The ungated spillway section forms the largest portion of the dam. The 700 foot long weir is composed of concrete. The discharge coefficient (c) for the ogee crest varies with the head of water flowing over the section. Coefficients ranging from 3.3 to 3.54 were used in the computations. These coefficients were obtained from Table 5-13 in the Handbook of Hydraulics.

The computed discharge capacity for the water surface at the top of lock (elevation 56.BCD) was 61,408 cfs. Since the present crest elevation of the failed auxiliary spillway section could not be determined, flow over this 143 foot section was not included in the total discharge capacity.

The spillway does not have sufficient capacity for discharging the peak outflow from one-half of the Probable Maximum Flood (PMF). For this storm event, the peak inflow and the peak outflow would be approximately 191,000 cfs. The PMF peak discharge would be approximately 382,000 cfs.

#### 5.4 RESERVOIR CAPACITY

The normal water surface is at or slightly above the spillway crest. Storage capacity of the reservoir with the water surface at the spillway crest is approximately 1150 acre-feet. The storage capacity to the top of the lock is 2716 acre-feet. The upstream limit of the reservoir is the Lock 3 Dam north of Mechanicville.

#### 5.5 FLOODS OF RECORD

The maximum known discharge occurred on March 28, 1913 when a flow of 120,000 cfs was recorded at the Lock 3 Dam, approximately one mile upstream of this structure. The computed water surface elevation for this flow was 59.7 (BCD) which is more than 3 feet over the top of the lock.

#### 5.6 OVERTOPPING POTENTIAL

Analysis indicates that the spillway does not have sufficient discharge capacity for either the PMF ( $Q=382,000$  cfs) or one half ( $Q=191,000$  cfs) of the PMF. Using spillway capacities calculated in the manner described in section 5.3, the depth of flow over the top of the lock would be 8.1 feet for one half the PMF and 16.6 feet for the PMF.

#### 5.7 EVALUATION

The spillway capacity is inadequate for the peak outflow from one half the PMF. For such large storm events, a high tailwater condition would occur resulting in the flooding of the downstream hazard areas. Due to this condition, the failure of the dam would not significantly increase the hazard to loss of life from that which would exist just before overtopping failure. Therefore, the spillway capacity is rated as inadequate.

## SECTION 6: STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

Inspection of the main spillway was not possible due to the flow over the section. Some deterioration of the concrete on this section was noted as was described in Section 3. The concrete on the gatehouse section was seriously deteriorated with substantial flow coming through one of the gates. The auxiliary spillway section had failed completely. Large sections of concrete which had broken off the spillway were in the channel downstream of their original location.

#### b. Data Review and Stability Evaluation

A sectional elevation prepared in 1904 for the spillway portion of the dam was used to perform a structural stability analysis. Since no plans of the gatehouse section could be located, it was not possible to analyze that segment. The following conditions were analyzed:

1. Normal conditions with water level at spillway crest elevation
2. Water level at spillway crest with ice load of 5,000 lb/ft.
3. Water level at elevation of assumed maximum flood (59.7 BCD); flow depth of 11.7 feet over spillway
4. Water level at elevation of one-half PMF (64.6 BCD); flow depth of 16.6 feet over spillway.

The safety factors for overturning and sliding obtained from the analyses are:

<u>Condition</u>	<u>Results of Analysis</u>		<u>Sliding</u>
	<u>Overturning</u>	<u>Resultant Within Middle Third</u>	
1) Normal water level	2.01	YES	1.46
2) Ice load with normal water level	1.63	YES	.85
3) Flood of record, flow depth 11.7	1.60	YES	.57
4) 1/2 PMF, flow depth of 16.6 feet	1.48	YES	.46

The results of these analyses indicate that the safety factors with respect to sliding are deficient when the structure is subjected to severe loading conditions such as ice loading or flood flows. A more detailed analysis of the structural stability is required. Field investigations to accurately define the dimensions of the spillway section and to develop cross sections of the gatehouse section should be undertaken. Information obtained should then be incorporated into a stability evaluation of the structure. Based on the results of this evaluation, it should be determined whether modifications to the structure are required.

e. Seismic Stability

A seismic stability analysis was performed for this structure in accordance with Corps of Engineer's Guidelines using normal conditions and a seismic coefficient of 0.10. The analysis indicated that the factor of safety for overturning with seismic considerations included was 1.65 and the resultant force falls within the base of the dam. The factor of safety against sliding was 0.93.

## **SECTION 7: ASSESSMENT/RECOMMENDATIONS**

### **7.1 ASSESSMENT**

#### **a. Safety**

The Phase I inspection of the Lock 2 Dam revealed several deficiencies which can affect the safety of the dam. The auxiliary spillway section had failed allowing a portion of the river to flow around the end of the dam. There was serious leakage in the vicinity of one of the gates in the gatehouse section.

The spillway, while not having sufficient discharge capacity for passing one-half of the PMF, is considered to be inadequate. During periods of unusually heavy precipitation, continuous surveillance should be provided both at the dam and in the downstream areas to warn of hazardous flooding conditions. A detailed emergency operation plan and warning system should be developed.

#### **b. Adequacy of Information**

The information available, while sufficient for the preparation of the Phase I inspection report, was deficient in several respects. The cross section of the spillway used in the preparation of the report did not agree with measurements made at the time of the inspection. In addition, no information was available concerning the present elevation of the failed auxiliary spillway section at the eastern end of the dam.

#### **c. Need for Additional Investigations**

Further analysis of the structural stability of this dam is needed. These studies should include subsurface and structural investigations to obtain information about the condition of the structure and its foundation. Accurate cross sections of the dam should also be developed. This information should then be incorporated into a detailed stability evaluation.

Studies are also required to determine a means of reconstructing the failed auxiliary spillway section and of repairing the leak in the gatehouse section.

#### **d. Urgency**

The investigations of the structural stability into the reconstruction of the auxiliary spillway and concerning the repair of the gatehouse section should be commenced within 3 months of the date of notification of the owner. Remedial work deemed necessary as a result of these investigations should be completed within 18 months. Other deficiencies noted should be corrected within 12 months of the date of notification.

### **7.2 RECOMMENDED MEASURES**

1. Upon completion of the structural stability analysis, appropriate modifications to the structure should be made.
2. The serious leak in the gatehouse section as well as the deteriorated concrete in this area should be repaired.
3. The auxiliary spillway section should be reconstructed.
4. The erosion at the east abutment, beyond the auxiliary spillway section should be treated.

5. The deteriorated concrete on the main spillway section should be repaired.
6. The area where minor sloughing and erosion has occurred at the contact between the gatehouse and the west abutment should be regraded.
7. Develop an emergency action plan for notification of downstream residents.

APPENDIX A

PHOTOGRAPHS



Spillway Section - View from Western End of Dam



Spillway Section - View from Eastern End of Dam; Note Irregularities in Flow (Rooster Falls)



Upstream Face of Gatehouse Segment - Note Deteriorated Concrete



Crest of Gatehouse Section - Note Cracking of Concrete and  
Trees Growing on Downstream Face



Downstream Face of Gatehouse Section - Note Flow Coming  
Through Fourth Bay from East End



Base of Gatehouse Section - Note Deteriorated Concrete on Wall  
Separating Bays



**Surface Erosion and Sloughing at Western End of Gatehouse Section**



**Erosion and Deterioration of Shale Outcrop at Western End of Dam**



View Looking West Across Axis of Dam in Area Where  
Auxiliary Spillway used to Stand



Failed Auxiliary Spillway Section - Segments of Concrete  
which had Broken off are now in Downstream Channel



Failed Wall at Eastern End of Auxiliary Spillway Section



Erosion of Abutment at East End of Dam



**Jetty Separating Barge Canal from Spillway Section**



**Champlain Canal Lock 2 and Niagara Mohawk Power Station at  
Western End of Dam**

APPENDIX B

VISUAL INSPECTION CHECKLIST

1

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam LOCK C-2 AT MECHANICVILLE  
Fed. I.D. # 988 DEC Dam No. #225A-102  
River Basin UPPER HUDSON  
Location: Town MECHANICVILLE County SARATOGA-RENSSELAER  
Stream Name HUDSON RIVER  
Tributary of —  
Latitude (N) 42° 52.8' Longitude (W) 73° 40.6'  
Type of Dam CONCRETE  
Hazard Category C  
Date(s) of Inspection 8/13/80  
Weather Conditions OVERCAST  
Reservoir Level at Time of Inspection UPSTREAM 48.7 DOWNSTREAM 30.6

b. Inspection Personnel W.C. LYNICK R.L. WARRENDER

c. Persons Contacted (Including Address & Phone No.) REGION 1  
WATERWAYS MAINTENANCE - JACK HUNTINGTON  
LESTER MOLL - CHIEF OPERATOR - LOCK 2 (664-4961)

d. History: Prior To  
Date Constructed 1897 Date(s) Reconstructed 1904  
Designer —  
Constructed By —  
Owner NYS/DOT WATERWAYS MAINTENANCE SUBDIVISION

NO EMBANKMENT, DRAINAGE SYSTEM, OR INSTRUMENTATION  
THEREFORE PAGES 2, 3 & 4 ARE NOT INCLUDED

5

5) Reservoir

- a. Slopes LOW AREAS - RIVER SWAMPY  
EAST ABUTMENT RISES SHARPLY - SOME SHALE OUTCROPS
- b. Sedimentation NONE APPARENT
- c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) NUMBER OF  
HOMES' DOWNSTREAM
- b. Seepage, Unusual Growth NONE
- c. Evidence of Movement Beyond Toe of Dam NONE
- d. Condition of Downstream Channel WIDE RIVER - SHALE OUTCROPS  
ON EAST END

7) Spillway(s) (Including Discharge Conveyance Channel)

MAIN DAM IS OVERFLOW SECTION 700 FT LONG - AUX. SPILLWAY  
SECTION AT EAST END OF DAM 143 FT LONG - (FAILED SECTION

- a. General
- b. Condition of Service Spillway SATISFACTORY - EXCEPT FOR 6 ROOSTER  
TAILS - THE 2 MOST EASTERLY ONES WERE THE WORST &  
APPEAR TO HAVE SIGNIFICANT CONCRETE REMOVAL  
ALSO 2 ROOSTER TAILS IN APRON  $\frac{1}{2}$  WAY OUT FROM  
EAST END OF SPILLWAY

- c. Condition of Auxiliary Spillway FAILED SECTION AT EAST END OF DAM  
CONCRETE SECTIONS HAVE FAILED & SEGMENTS ARE SITTING  
IN CHANNEL DOWNSTREAM OF THEIR ORIGINAL LOCATION

- d. Condition of Discharge Conveyance Channel MAIN CHANNEL-GOOD  
EAST END-HAS PROBLEMS - FAILURE OF AUXILIARY SECTION  
HAS CAUSED SERIOUS EROSION PROBLEMS & MUCH SCOUR ON EAST  
ABUTMENT- WALL WHICH USED TO DEFLECT FLOW AWAY FROM  
ABUTMENT ALSO FAILED. HIGHLY WEATHERED SHALE IN CHANNEL

8) Reservoir Drain/Outlet 12 INOPERABLE GATES ON GATE HOUSE

Type: Pipe \_\_\_\_\_ Conduit \_\_\_\_\_ Other \_\_\_\_\_

Material: Concrete \_\_\_\_\_ Metal \_\_\_\_\_ Other \_\_\_\_\_

Size: \_\_\_\_\_ Length \_\_\_\_\_

Invert Elevations: Entrance \_\_\_\_\_ Exit \_\_\_\_\_

Physical Condition (Describe): \_\_\_\_\_ Unobservable \_\_\_\_\_

Material: \_\_\_\_\_

Joints: \_\_\_\_\_ Alignment \_\_\_\_\_

Structural Integrity: \_\_\_\_\_

Hydraulic Capability: \_\_\_\_\_

Means of Control: Gate \_\_\_\_\_ Valve \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Operation: Operable \_\_\_\_\_ Inoperable ☒ Other \_\_\_\_\_

Present Condition (Describe): GATES WERE SEALED WHEN  
GATEHOUSE WAS TORN DOWN & DREDGE MATERIAL WAS  
DUMPED ON UPSTREAM SIDE

9) Structural - GATE HOUSE SECTION

- a. Concrete Surfaces MODERATE SURFACE SPALLING & CRACKING <sup>IN</sup> ~~CONCRETE~~  
CONCRETE ALONG UPSTREAM FACE OF ENTIRE BUILDING  
SIGNIFICANT SURFACE CONCRETE DETERIORATION AT GATE ENTRANCE  
BOTH ABOVE & BELOW WATERLINE
- b. Structural Cracking YES - AROUND ALL ANCHOR BOLTS OF FORMER  
GATE CONTROL MACHINERY WITH RESULTING LOSS OF CONCRETE  
(6" WIDE BLOCKS)
- c. Movement - Horizontal & Vertical Alignment (Settlement) NONE APPARENT
- d. Junctions with Abutments or Embankments SOME UNDERMINING, SLIGHT  
EROSION & MINOR SLOUGHING AT WEST ABUTMENT  
CONTACT.
- e. Drains - Foundation, Joint, Face DOWNSTREAM FACE - TREES &  
VEGETATION ESTABLISHED ON CONCRETE FACE OF  
GATE BUILDING
- f. Water Passages, Conduits, Sluices 12 INOPERABLE GATES  
ALL GATES SEALED IN LATE 60'S.  
SUBSTANTIAL DETERIORATION OF GATEHOUSE BAYS - LARGE  
VOID AT FIFTH BAY FROM ~~WEST~~ WESTERN END
- g. Seepage or Leakage MINOR LEAKAGE THRU ALL GATES  
MAJOR LEAK ON THE THIRD GATE FROM THE  
WEST END - FLOW IS SO SUBSTANTIAL THAT IT IS  
CAUSING FLOW INTO THE FOURTH BAY

- h. Joints - Construction, etc. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- i. Foundation \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- j. Abutments MINOR EROSION & SLOUGHING AT WEST ABUTMENT  
\_\_\_\_\_  
\_\_\_\_\_
- k. Control Gates GATES ARE INOPERABLE  
\_\_\_\_\_  
\_\_\_\_\_
- l. Approach & Outlet Channels \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- m. Energy Dissipators (Plunge Pool, etc.) NATURAL RIVER BED  
\_\_\_\_\_  
\_\_\_\_\_
- n. Intake Structures \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- o. Stability \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- p. Miscellaneous STEEL SHEET PILE WALL UPSTREAM OF  
MAIN SPILLWAY  
\_\_\_\_\_  
\_\_\_\_\_

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

## a. Description and Condition

LOCK C-2 - AT WESTERN END OF DAMIS OPERATIONAL & IN SATISFACTORYCONDITIONNIAGARA MOHAWK POWER STATION - SATISFACTORY CONDITION

APPENDIX C

HYDROLOGIC/HYDRAULIC  
ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam - <del>Top of Lock</del>	<u>56.5</u>	<u>385</u>	<u>2716</u>
2) Design High Water (Max. Design Pool)	<u>          </u>	<u>          </u>	<u>          </u>
3) Auxiliary Spillway Crest - <del>Failed</del>	<u>No LONGER</u> <u>IN EXISTENCE</u>	<u>          </u>	<u>          </u>
4) Pool Level with Flashboards	<u>          </u>	<u>          </u>	<u>          </u>
5) Service Spillway Crest	<u>48.0</u>	<u>286</u>	<u>1146</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>          </u>
2) Spillway @ Maximum High Water	<u>61,408</u>
3) Spillway @ Design High Water	<u>          </u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>          </u>
5) Low Level Outlet	<u>          </u>
6) Total (of all facilities) @ Maximum High Water	<u>          </u>
7) Maximum Known Flood	<u>120,000</u>
8) At Time of Inspection	<u>          </u>

CREST:

ELEVATION: 56.5Type: LOCK WALLWidth: 45 FT

Length: \_\_\_\_\_

Spillover MAIN DAM-SPILLWAY SECTION

Location \_\_\_\_\_

SPILLWAY:

PRINCIPAL

48.0

Elevation

FAILED

EMERGENCY

CONCRETE OVERFLOW

Type \_\_\_\_\_

Width \_\_\_\_\_

Type of Control

✓

Uncontrolled \_\_\_\_\_

Controlled:

Type \_\_\_\_\_

(Flashboards; gate)

Number \_\_\_\_\_

Size/Length \_\_\_\_\_

Invert Material \_\_\_\_\_

Anticipated Length  
of operating service \_\_\_\_\_

Chute Length \_\_\_\_\_

Height Between Spillway Crest  
& Approach Channel Invert  
(Weir Flow) \_\_\_\_\_

HYDROMETEROLOGICAL GAGES:

Type : STAFF GAGE & WATER - STAGE RECORDER AT LOCK 3

Location: ON RT BANK JUST UPSTREAM OF LOCK 3

Records: (USGS)

Date - 10/1887 TO 9/1956

Max. Reading - HEAD = 11.67' 3/28/1913

DISCHARGE = 120,000 cfs

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

POWER HOUSE OR LOCK C2

DRAINAGE AREA: 4570

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: 1/2 - 2/3 AREA IN ADIRONDACK MOUNTAINS

Terrain - Relief: ELEVATIONS RANGE FROM +5344 TO +48 AT DAM

Surface - Soil: VARIES

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

N/A

Potential Sedimentation problem areas (natural or man-made; present or future)

N/A

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

N/A

Dikes - Floodwalls (overflow & non-overflow ) - Low reaches along the Reservoir perimeter:

Location: NONE

Elevation: \_\_\_\_\_

Reservoir:

Length @ Maximum Pool \_\_\_\_\_ (Miles)

Length of Shoreline (@ Spillway Crest) \_\_\_\_\_ (Miles)

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
LOCK 2 DAM AT MECHANICVILLE	1		
SUBJECT	COMPUTED BY	DATE	
STREAM FLOW GAGE DATA	RLW	9/5/80	
RECORDS TAKEN FROM INFORMATION USED ON THE			
LOCK 3 DAM NY 215 REPORT			
USGS WSP 1302: (RECORDS TO SEPT. 1950)			
GAGE #61: MAX Q = 120000 cfs ON 3/28/1913			
MAX Q = 118000 cfs ON 1/1/1919			
USGS WSP 1722 (RECORDS OCT. 1950 TO SEPT. 1960)			
GAGE #R355: DISCONTINUED SEPT. 1956			
MAX Q - SAME AS ABOVE			
AFTER SEPT. 1956			
GAGE #3580 (-) GAGE #3575 = APPROX LOCK 2 FLOW			
#3580 - HUDSON RIVER @ GREEN ISLAND, NY			
#3575 - MONADK RIVER @ CANTON, NY			
APRIL 4 <sup>th</sup> , 1960			
#3580 134,900 cfs			
#3575 83,300 cfs			
351,400 cfs [NOT A MAX. Q]			
JUNE 24, 1978 (HURRICANE AGNES)			
MEAN DAILY			
#3580 78900 cfs [NOT A MAX. Q]			
#3575 90900 cfs			

PROJECT GRID

JOB	LOCK 2 DAM AT MECHANICVILLE	SHEET NO.	2	CHECKED BY		DATE	
SUBJECT	STREAMFLOW GAGE DATE & SIMULATION DATA			COMPUTED BY	RLW	DATE	9/5/80
"UPPER HUDSON & MONTAUK RIVER BASINS"							
"HYDROLOGIC FLOOD ROUTING MODELS"							
GREATEST ANNUAL PEAKS OF RECORD - TABLE 4.1							
3/28/1913		117,000 cfs		APPROX. MAX Q.		←	
12/31/1948		94,400 cfs					
4/12/1932		72,900 cfs					
TABLE 6.39: (RESULTS FROM SIMULATION)							
SPF = 191,121 cfs				SPS RAINFALL - 9.5"			
TRANSPOSED AGNES = 251,604 cfs				PMP RAINFALL - 22" (TP-40)			
PMF ≈ 2 × SPF				TRANSPOSED AGNES RAINFALL = 11"			
				HR #33 PMP RAINFALL 19.5"			
PEAK DISCHARGE (PMF) = 382,242 cfs				USE 382,000 cfs ←			

PROJECT GRID

JOB LOCK 2 DAM AT MECHANICVILLE		SHEET NO. 3	CHECKED BY	DATE
SUBJECT DISCHARGE COMPUTATIONS		COMPUTED BY RLW		DATE 9/5/80

DISCHARGE COEFFICIENT - SPILLWAY SECTION

TAKEN FROM FIG. 5-13 BASED ON SECTION 5-20  
HANDBOOK OF HYDRAULICS

HEAD	1.0	2.0	3.0	4.0	5.0	ADDED FACTOR
"C" VALUE	3.3	3.42	3.47	3.54	3.54	3.54

DISCHARGE IN SPILLWAY SECTION L=700 FT

ELEVATION	H	C	Q
48.0	—	—	0
49.0	1.0	3.3	2310
50.0	2.0	3.42	6771
52.0	4.0	3.54	19824
54.0	6.0	3.54	36419
56.0	8.0		56071
56.5	8.5		61408
58.0	10.0		78361
60.0	12.0		108008
62.0	14.0		129806
64.0	16.0		153592
67.0	19.0		205226
70.0	22.0		255702
72.0	24.0		291353
73.0	25.0		308750

PROJECT GRID

JOB LOCK 2 AT MECHANICVILLE		SHEET NO. 4	CHECKED BY	DATE
SUBJECT DISCHARGE COMPUTATIONS		COMPUTED BY RLW		DATE 9/5/80

FLOW OVER GATEHOUSE AND LOCK AT WESTERN END OF DAM

← 335' →

ELEV. 56.5

GATEHOUSE GRASSED EARTH LOCK LOCK WALL POWER HOUSE

ELEV. 48.0  
SPILLWAY

DISCHARGE COMPUTATIONS  $C=3.087$   $L=335\text{ft}$

ELEVATION	H	Q
56.5	—	—
57.0	0.5	366
58.0	1.5	1900
60.0	3.5	6771
62.0	5.5	13337
64.0	7.5	21241
67.0	10.5	35186
70.0	13.5	51296
72.0	15.5	63107
73.0	16.5	69312

AUXILIARY SPILLWAY CAPACITY FOR HISTORICAL RECORDS

ASSUME ELEVATION OF CREST = 50.0

$C=3.54$  (WITH HEAD > 5 FT)  $L=143\text{ft}$

ELEVATION	H	Q
58.0	8	11454
60.0	10	16008
62.0	12	21243
64.0	14	26517

PROJECT GRID

JOB LOCK 2 AT MECHANICVILLE			SHEET NO. 5		CHECKED BY		DATE	
SUBJECT DISCHARGE COMPUTATIONS					COMPUTED BY RLW		DATE 9/5/80	

ESTIMATE OF DEPTH OF FLOWS FOR VARIOUS FLOOD FLOWS						
DEPTH OF FLOW WHICH COULD BE EXPECTED DURING PMF & 1/2 PMF						
ELEVATION	SPILLWAY SECTION		GATEHOUSE & LOCK		Q TOTAL	
	HEAD	Q	HEAD	Q		
73.0	25.0	309750	16.5	69312	379062	
73.1	25.1	311611	16.6	69943	381554	
73.2	25.2	313474	16.7	70576	384050	
69.5	16.5	166084	8.0	23400	189484	
69.6	16.6	167596	8.1	23840	191436	

DEPTH OF FLOW WHICH MAY HAVE OCCURRED DURING FLOOD OF RECORD							
ELEVATION	MAIN SPILLWAY		AUX. SPILLWAY		GATEHOUSE & LOCK		TOTAL Q
	HEAD	Q	HEAD	Q	HEAD	Q	
59.7	11.7	99170	9.7	15293	3.2	5920	120383
59.8	11.8	100944	9.8	15530	3.3	6199	122173

PMF

1/2 PMF

USE  
THIS

USE  
THIS

PROJECT GRID

JOB	LOCK 2 AT MECHANICVILLE	SHEET NO.	6	CHECKED BY		DATE	
SUBJECT	STORAGE - SURFACE AREA COMPUTATIONS	COMPUTED BY	RLW	DATE	9/5/80		
WATER SURFACE - PLANIMETERED FROM BARGE CANAL MAP							
AREA BETWEEN LOCK 2 & 3 = 5.25 IN <sup>2</sup>							
- .66 IN <sup>2</sup> FOR 2 ISLANDS							
4.59 IN <sup>2</sup>							
1 IN <sup>2</sup> = 63.26 ACRES							
4.59 IN <sup>2</sup> = 290.4 ACRES							
AREA PLANIMETERED ON USGS QUAD SHEET FOR MECHANICVILLE							
SURFACE AREA = 3.59 IN <sup>2</sup>							
- .47 IN <sup>2</sup>							
3.12 IN <sup>2</sup>							
1 IN <sup>2</sup> = 91.83 ACRES							
3.12 IN <sup>2</sup> = 286.5 ACRES							
PLANIMETERED 50 CONTOUR ON USGS SHEET = 51 BCD							
ELEV.							
AREA = 3.89 IN <sup>2</sup>							
- .30 IN <sup>2</sup>							
3.59 IN <sup>2</sup> → 379.7 ACRES							
PLANIMETERED 60 CONTOUR ON USGS SHEET = 61 BCD							
ELEV.							
AREA = 4.86 IN <sup>2</sup>							
- .17 IN <sup>2</sup>							
4.69 IN <sup>2</sup> → 430.7 ACRES							
BARGE CANAL MAP STATES THAT CHANNEL DEPTH IS 12 FT.							
SO USE THAT TO CALCULATE STORAGE CAPACITY							

PROJECT GRID

JOB <b>LOCK 2 AT MECHANICVILLE</b>		SHEET NO. <b>7</b>	CHECKED BY	DATE
SUBJECT <b>STAGE - STORAGE COMPUTATIONS</b>		COMPUTED BY <b>RLW</b>		DATE <b>9/5/80</b>

USGS ELEV	BCD ELEV								
36	35	↑							
		$h = 12.4$							
47	48	↓							
51	50								
61	60								

AT BCD 48.0

$$V_1 = \frac{1}{3} A_1 h = (286.5) \left( \frac{12.4}{3} \right) = 1196 \text{ AC-FT}$$

AT BCD 51.0

$$V_2 = (329.7) \left( \frac{12.4}{3} \right) = 1648.2 \text{ AC-FT}$$

AT BCD 61.0

$$V_3 = (430.7) \left( \frac{12.4}{3} \right) = 3589.2 \text{ AC-FT}$$

STORAGE AT TOP OF LOCK BCD ELEVATION 56.5

3589.2	
1648.2	
1196.0	
6433.4	

$$\frac{(1196) \left( \frac{5.5}{1.0} \right)}{1.0} = 1067.5$$

$$+ \frac{1648.2}{1.0} = 2715.7$$

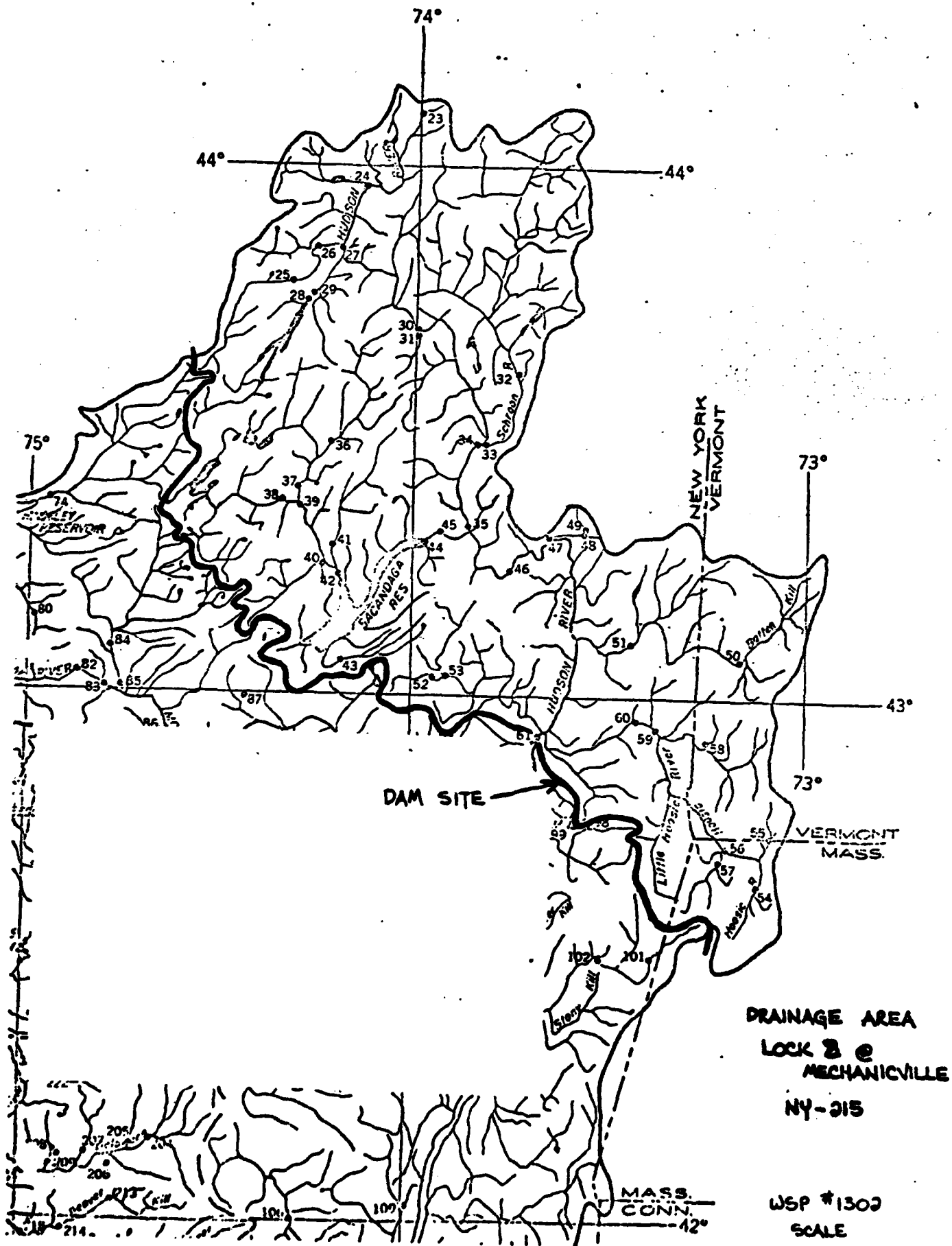
STORAGE AREA AT TOP OF LOCK

430.7	
329.7	
101.6	
861.0	

$$\frac{(101) \left( \frac{5.5}{1.0} \right)}{1.0} = 55.5$$

$$+ \frac{329.7}{1.0} = 385.2$$



## HUDSON RIVER BASIN

61. Hudson River at Mechanicville, N. Y.

Location.--Lat 42°54'45", long 73°40'45", on right bank at dam of West Virginia Pulp & Paper Co., at Mechanicville, Saratoga County, three quarters of a mile upstream from Anthony Kill, and 1½ miles downstream from Hoosic River.

Drainage area.--4,500 sq. mi.

Gage.--Water-stage recorder. Datum of gage is 66.63 ft above mean sea level, datum of 1929. Prior to 1911, staff gage at same site and datum.

Average discharge.--63 years (1887-1950), 7,370 cfs, revised (unadjusted).

Extremes.--1887-1950: Maximum discharge, 120,000 cfs Mar. 28, 1913; practically no flow for short periods when plant was shut down. Maximum known discharge prior to 1913, 70,000 cfs April, 1869 (Report of U. S. Board of Engineers on Deep Waterways). Since 1930, maximum discharge, 118,000 cfs Jan. 1, 1949.

Remarks.--Discharge computed from flow over spillway, through wheels, and through lock of Champlain Canal since Sept. 30, 1915. Flow appreciably regulated by Indian Lake since 1936 (see p. 45), and Sacandaga Reservoir since Mar. 27, 1933 (see p. 62). During canal navigation season, water is diverted through Glens Falls feeder, Bond Creek (see p. 66, 67), and Champlain Canal into Lake Champlain basin and occasionally may receive water from that basin through summit level of Champlain Canal at Dunham basin. No adjustment made for these diversions.

Corporation.--Records of discharge over spillway and through wheels furnished by West Virginia Pulp & Paper Co.

Monthly and yearly mean discharge, in cubic feet per second												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1888	2,365	4,190	8,016	5,367	3,714	6,845	21,200	21,420	4,917	1,537	1,725	2,451
1889	4,528	5,541	10,014	13,963	3,780	8,280	13,690	8,871	8,869	9,727	4,272	1,963
1890	3,740	7,886	13,226	11,372	7,913	11,129	18,053	17,931	7,392	1,950	2,019	8,644
1891	9,215	9,121	3,244	8,284	11,664	17,736	20,021	5,333	3,200	2,337	2,666	2,040
1892	1,473	1,084	8,377	18,857	9,283	10,929	21,354	13,422	12,335	9,287	5,465	4,446
1893	2,819	7,504	4,331	5,192	4,808	8,250	17,488	22,245	4,801	2,521	5,005	6,870
1894	3,665	5,539	7,217	6,757	6,634	14,758	11,135	7,566	7,087	3,188	2,454	1,886
1895	3,448	6,379	4,367	7,576	3,543	4,204	23,822	4,650	2,616	2,558	3,301	2,429
1896	2,631	4,421	10,999	4,791	4,468	13,600	24,972	4,610	4,728	2,772	2,462	2,878
1897	4,108	3,353	6,913	4,007	3,993	12,214	18,374	12,187	11,853	11,108	9,541	7,754
1898	2,326	3,795	24,352	6,173	6,036	19,317	13,547	10,525	5,069	2,751	5,028	3,810
1899	7,514	8,978	5,291	6,437	5,147	9,316	24,407	9,581	2,538	2,402	1,417	2,054
1900	2,614	6,044	7,538	5,841	12,484	7,740	22,414	8,992	4,083	2,382	2,703	1,886
1901	2,178	3,077	5,351	3,067	2,668	6,085	28,268	11,454	7,804	3,551	4,661	4,024
1902	4,254	7,732	8,491	15,735	4,741	25,130	15,222	19,749	6,315	4,234	6,286	3,443
1903	6,894	7,074	9,142	7,034	9,885	30,938	14,013	3,503	8,472	4,363	5,905	4,116
1904	10,117	5,769	5,737	8,095	5,458	11,053	20,737	11,373	4,785	3,833	5,483	6,640
1905	11,028	6,844	3,922	6,097	5,544	9,388	22,748	8,171	9,592	6,938	5,631	12,032
1906	4,265	5,853	15,510	9,310	7,650	9,000	20,400	13,400	9,280	5,780	3,480	3,070
1907	3,572	5,136	4,872	12,250	4,140	9,570	16,530	23,930	5,560	4,120	2,370	6,150
1908	3,603	5,000	17,406	8,410	6,690	26,000	25,300	17,900	3,700	2,180	1,370	1,020
1909	3,571	5,510	2,310	5,100	11,620	9,297	28,800	27,000	6,020	2,160	2,460	7,090
1910	1,564	1,440	1,570	4,130	3,480	21,600	17,600	9,230	10,200	1,800	1,880	2,270
1911	2,541	5,289	2,010	5,270	3,370	3,780	16,800	9,280	4,450	1,380	1,180	2,000
1912	2,243	5,940	10,000	4,780	3,400	10,000	27,400	12,800	3,840	1,310	1,270	16,480
1913	6,332	2,820	8,640	12,700	3,720	25,300	16,800	16,800	3,930	1,780	1,070	11,170
1914	2,723	6,280	4,840	2,310	3,070	7,500	33,700	12,900	2,330	2,140	1,450	1,930
1915	1,240	2,130	2,590	4,480	10,500	9,110	12,900	5,340	1,940	8,300	7,880	3,350
1916	4,301	4,200	6,630	10,000	10,100	8,910	27,900	13,000	4,900	3,830	1,710	1,920
1917	2,240	4,020	5,760	4,500	2,780	12,900	21,300	10,100	4,200	4,360	1,470	1,770
1918	3,690	6,130	2,600	1,440	4,720	12,000	21,600	10,500	4,870	2,310	1,870	3,130
1919	4,943	3,809	8,180	6,810	3,430	11,000	15,400	13,200	4,080	2,680	1,970	3,710
1920	5,024	3,950	6,480	2,210	1,970	13,600	26,400	9,830	3,380	2,320	2,680	1,970
1921	3,960	6,070	23,000	5,110	3,780	11,800	12,700	5,750	1,780	4,390	2,010	1,390
1922	2,010	5,430	7,070	3,100	4,010	14,800	30,300	11,300	11,800	5,770	3,120	2,490
1923	3,371	7,420	1,830	4,310	2,980	7,080	28,200	13,100	3,970	1,870	1,300	1,600
1924	2,400	4,970	9,110	10,720	5,780	9,330	28,400	20,300	3,630	2,040	1,870	3,000
1925	3,563	3,920	4,320	2,900	4,970	18,200	18,100	8,500	4,810	4,470	4,600	6,730
1926	6,677	5,900	5,240	4,980	4,020	4,190	22,900	13,300	5,660	1,170	2,510	1,670
1927	5,247	5,000	1,850	5,570	4,550	15,800	15,400	9,800	4,130	2,070	2,230	2,830
1928	4,114	5,000	8,400	7,140	8,730	18,800	18,300	10,300	5,820	4,410	4,140	2,720
1929	2,483	3,270	3,670	5,280	3,820	18,800	24,300	10,900	5,980	2,960	2,480	7,770
1930	2,960	3,910	4,880	6,380	7,180	12,800	10,700	6,480	6,410	3,110	2,430	2,370
1931	2,480	2,860	2,700	2,380	1,810	3,460	10,400	7,170	5,180	4,130	3,380	3,690
1932	4,170	5,080	7,550	10,500	7,580	8,850	14,800	9,360	3,830	1,580	1,790	3,780
1933	7,050	3,300	7,610	7,610	7,100	7,460	22,300	9,820	3,840	2,970	3,630	4,070
1934	3,895	4,212	5,315	6,207	3,507	9,315	18,360	5,807	4,687	3,127	2,963	2,647
1935	5,337	4,423	5,064	6,367	6,283	9,703	9,798	8,668	5,973	12,740	5,749	4,336
1936	4,537	6,372	8,325	4,999	2,859	25,000	18,740	9,128	3,564	2,736	2,561	3,068
1937	4,958	6,117	7,368	12,830	7,023	6,309	13,030	13,750	7,164	5,168	4,927	4,227
1938	4,673	6,864	6,778	7,744	10,430	10,510	6,858	5,317	3,394	4,244	4,008	11,320
1939	5,793	5,700	7,610	5,165	3,925	10,020	20,310	9,971	4,732	3,332	3,035	3,977
1940	2,686	3,670	7,761	2,439	2,240	4,483	18,840	15,490	8,604	3,681	3,643	4,734

\* Corrected.

\* Not previously published; partly estimated on basis of records in reports of State engineer and surveyor of New York.

## Monthly and yearly mean discharge, in

Water year	Oct.	Nov.	Dec.	Jan.	Feb.
1941	5,762	8,806	8,013	8,004	6,167
1942	2,378	4,066	4,733	5,174	5,287
1943	6,596	8,376	8,592	6,782	7,005
1944	3,535	6,884	5,213	3,006	3,632
1945	4,203	6,283	3,915	6,116	5,230
1946	13,640	2,850	8,678	8,146	5,749
1947	4,813	4,497	5,347	7,522	7,114
1948	3,024	4,156	3,412	4,472	4,725
1949	2,446	4,676	8,478	8,463	2,900
1950	3,535	4,467	7,362	10,592	7,324

Monthly					
Water year	Oct.	Nov.	Dec.	Jan.	Feb.
1888	0.61	1.04	2.05	1.62	0.33
1889	1.18	2.84	2.57	2.21	1.98
1890	0.98	1.96	3.39	2.69	1.51
1891	2.36	2.76	2.3	1.11	1.1
1892	0.36	1.01	2.57	4.25	1.1
1893	0.72	1.89	1.53	1.73	1.22
1894	0.98	1.85	1.73	1.73	1.22
1895	0.94	1.54	1.12	0.98	1.02
1896	0.69	2.08	2.79	1.74	1.12
1897	1.05	2.32	1.76	1.03	0.90

Yearly data			
Year	V.S.P. no.	Maximum day	
		Discharge	Date
1888	24	-	-
1889	24	-	-
1890	24	-	-
1891	24	-	-
1892	24	-	-
1893	24	-	-
1894	24	-	-
1895	24	-	-
1896	38	-	-
1897	38	-	-
1898	47	39,231	Mar. 14, 1898
1899	47	41,475	Apr. 28, 1899
1900	47	43,544	Apr. 23, 1900
1901	55	54,862	Apr. 24, 1901
1902	82	42,840	Mar. 18, 1902
1903	97	56,283	Mar. 29, 1903
1904	166	36,305	Apr. 11, 1904
1905	166	48,877	Apr. 11, 1905
1906	202	40,300	Apr. 16, 1906
1907	241	16,700	Apr. 1, 1907
1908	241	34,300	Apr. 29, 1908
1909	281	46,300	Apr. 16, 1909
1910	281	37,900	Apr. 3, 1910
1911	301	26,200	May 3, 1911
1912	321	47,275	Apr. 8, 1912
1913	351	42,000	Mar. 28, 1913
1914	381	64,788	Apr. 22, 1914
1915	401	33,188	Feb. 28, 1915
1916	431	35,848	Apr. 2, 1916
1917	451	34,300	June 25, 1917
1918	471	36,800	Apr. 18, 1918
1919	501	31,600	Apr. 12, 1919
1920	501	38,100	Apr. 6, 1920
1921	521	33,000	Mar. 22, 1921
1922	541	72,922	Apr. 18, 1922
1923	561	42,710	Apr. 11, 1923
1924	581	39,811	Apr. 19, 1924
1925	601	44,300	Mar. 20, 1925
1926	621	51,800	Apr. 26, 1926
1927	641	36,000	Mar. 21, 1927
1928	661	70,000	Nov. 4, 1928
1929	681	60,200	Mar. 28, 1929
1930	696	23,600	Apr. 8, 1930
1931	711	26,300	July 22, 1931
1932	726	27,700	Apr. 12, 1932
1933	741	66,700	Apr. 19, 1933
1934	756	29,400	Apr. 12, 1934
1935	784	34,000	Jan. 10, 1935

## HUDSON RIVER BASIN

81

N. Y.

dam of West Virginia Pulp &amp; Paper Co. a mile upstream from

above mean sea level, datum of

red (unadjusted).

1928, 1929; practically no flow

1931, 1932 (Report of U. S. Board

1949.

high wheels, and through lock of  
regulated by Indian Lake since  
1928 (see p. 62). During  
the Fall, Bond Creek (see  
basin and occasionally may re-  
amplify Canal at Durham basin.

high wheels furnished by West

cubic feet per second

Year	July	Aug.	Sept.	The year
1917	1,537	1,725	2,851	7,098
1918	1,727	4,272	1,963	7,962
1919	1,825	2,019	9,844	9,030
1920	2,337	2,684	2,040	7,022
1921	2,387	2,686	4,448	10,488
1922	2,321	5,028	8,870	7,506
1923	1,164	2,684	4,448	6,197
1924	2,888	3,801	2,829	9,718
1925	2,772	2,647	2,879	7,482
1926	2,102	2,781	2,784	6,874
1927	2,781	2,029	3,810	8,613
1928	2,402	1,617	2,084	7,108
1929	2,382	2,703	1,884	7,088
1930	1,881	4,661	4,024	7,314
1931	2,834	4,786	3,643	10,488
1932	4,843	9,908	4,118	9,322
1933	4,843	9,908	4,118	9,322
1934	4,843	9,908	4,118	9,322
1935	4,843	9,908	4,118	9,322
1936	4,843	9,908	4,118	9,322
1937	4,843	9,908	4,118	9,322
1938	4,843	9,908	4,118	9,322
1939	4,843	9,908	4,118	9,322
1940	4,843	9,908	4,118	9,322
1941	4,843	9,908	4,118	9,322
1942	4,843	9,908	4,118	9,322
1943	4,843	9,908	4,118	9,322
1944	4,843	9,908	4,118	9,322
1945	4,843	9,908	4,118	9,322
1946	4,843	9,908	4,118	9,322
1947	4,843	9,908	4,118	9,322
1948	4,843	9,908	4,118	9,322
1949	4,843	9,908	4,118	9,322
1950	4,843	9,908	4,118	9,322
1951	4,843	9,908	4,118	9,322
1952	4,843	9,908	4,118	9,322
1953	4,843	9,908	4,118	9,322
1954	4,843	9,908	4,118	9,322
1955	4,843	9,908	4,118	9,322
1956	4,843	9,908	4,118	9,322
1957	4,843	9,908	4,118	9,322
1958	4,843	9,908	4,118	9,322
1959	4,843	9,908	4,118	9,322
1960	4,843	9,908	4,118	9,322
1961	4,843	9,908	4,118	9,322
1962	4,843	9,908	4,118	9,322
1963	4,843	9,908	4,118	9,322
1964	4,843	9,908	4,118	9,322
1965	4,843	9,908	4,118	9,322
1966	4,843	9,908	4,118	9,322
1967	4,843	9,908	4,118	9,322
1968	4,843	9,908	4,118	9,322
1969	4,843	9,908	4,118	9,322
1970	4,843	9,908	4,118	9,322
1971	4,843	9,908	4,118	9,322
1972	4,843	9,908	4,118	9,322
1973	4,843	9,908	4,118	9,322
1974	4,843	9,908	4,118	9,322
1975	4,843	9,908	4,118	9,322
1976	4,843	9,908	4,118	9,322
1977	4,843	9,908	4,118	9,322
1978	4,843	9,908	4,118	9,322
1979	4,843	9,908	4,118	9,322
1980	4,843	9,908	4,118	9,322
1981	4,843	9,908	4,118	9,322
1982	4,843	9,908	4,118	9,322
1983	4,843	9,908	4,118	9,322
1984	4,843	9,908	4,118	9,322
1985	4,843	9,908	4,118	9,322
1986	4,843	9,908	4,118	9,322
1987	4,843	9,908	4,118	9,322
1988	4,843	9,908	4,118	9,322
1989	4,843	9,908	4,118	9,322
1990	4,843	9,908	4,118	9,322
1991	4,843	9,908	4,118	9,322
1992	4,843	9,908	4,118	9,322
1993	4,843	9,908	4,118	9,322
1994	4,843	9,908	4,118	9,322
1995	4,843	9,908	4,118	9,322
1996	4,843	9,908	4,118	9,322
1997	4,843	9,908	4,118	9,322
1998	4,843	9,908	4,118	9,322
1999	4,843	9,908	4,118	9,322
2000	4,843	9,908	4,118	9,322
2001	4,843	9,908	4,118	9,322
2002	4,843	9,908	4,118	9,322
2003	4,843	9,908	4,118	9,322
2004	4,843	9,908	4,118	9,322
2005	4,843	9,908	4,118	9,322
2006	4,843	9,908	4,118	9,322
2007	4,843	9,908	4,118	9,322
2008	4,843	9,908	4,118	9,322
2009	4,843	9,908	4,118	9,322
2010	4,843	9,908	4,118	9,322
2011	4,843	9,908	4,118	9,322
2012	4,843	9,908	4,118	9,322
2013	4,843	9,908	4,118	9,322
2014	4,843	9,908	4,118	9,322
2015	4,843	9,908	4,118	9,322
2016	4,843	9,908	4,118	9,322
2017	4,843	9,908	4,118	9,322
2018	4,843	9,908	4,118	9,322
2019	4,843	9,908	4,118	9,322
2020	4,843	9,908	4,118	9,322
2021	4,843	9,908	4,118	9,322
2022	4,843	9,908	4,118	9,322
2023	4,843	9,908	4,118	9,322
2024	4,843	9,908	4,118	9,322
2025	4,843	9,908	4,118	9,322
2026	4,843	9,908	4,118	9,322
2027	4,843	9,908	4,118	9,322
2028	4,843	9,908	4,118	9,322
2029	4,843	9,908	4,118	9,322
2030	4,843	9,908	4,118	9,322

Monthly and yearly mean discharge, in cubic feet per second, of Hudson River at Mechanicville, N. Y.—Continued

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1941	3,762	6,846	8,013	8,006	5,167	5,395	10,450	2,622	2,009	1,937	1,604	2,169	4,888
1942	2,378	4,066	4,733	5,174	3,287	9,743	13,210	5,357	7,587	3,702	3,075	4,475	5,616
1943	6,594	8,976	8,592	6,780	7,005	13,720	11,340	21,880	7,600	4,564	5,374	3,355	8,890
1944	3,535	6,884	5,213	3,008	3,832	8,929	17,480	9,474	7,422	4,557	3,188	3,577	6,413
1945	4,203	4,263	3,915	6,116	5,230	16,150	11,340	17,890	8,390	7,444	6,742	5,569	8,113
1946	13,842	2,850	8,478	8,146	5,968	15,180	5,654	8,330	7,911	5,636	3,816	3,388	8,210
1947	4,813	4,497	5,047	7,595	9,116	9,592	16,460	20,350	16,750	7,505	4,363	3,181	9,145
1948	3,024	4,158	3,412	2,803	4,223	15,820	13,330	10,490	7,235	4,117	3,470	2,567	6,245
1949	2,643	4,976	8,474	9,480	10,900	12,150	8,746	4,443	2,941	2,522	2,130	3,123	6,657
1950	3,747	4,767	7,442	7,797	7,797	12,150	8,746	4,443	2,941	2,522	2,130	3,123	7,114

Monthly and yearly runoff, in inches

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1941	0.61	1.04	2.08	1.82	0.89	1.75	5.26	5.49	1.22	0.39	0.44	0.71	21.47
1942	1.18	2.54	2.57	2.81	.88	2.12	3.39	2.27	1.70	1.47	1.29	.49	22.61
1943	.96	1.96	3.39	2.89	1.83	2.85	3.73	4.59	1.85	.50	.52	2.19	27.24
1944	2.36	2.26	.83	2.12	2.70	4.55	4.97	1.42	.79	.60	.68	.51	23.79
1945	.38	1.01	2.27	4.83	2.22	2.80	5.35	5.03	3.08	2.34	1.41	1.10	31.86
1946	.72	1.89	1.03	.82	1.03	2.11	4.44	5.71	1.19	.65	1.28	1.70	22.63
1947	.99	.90	1.85	1.73	1.12	3.78	2.76	1.94	1.76	.81	.63	.47	18.74
1948	.94	1.58	1.12	.80	.82	1.08	5.81	1.76	.70	.66	1.00	.66	17.21
1949	.69	2.08	2.79	1.74	1.12	3.48	6.20	1.16	1.18	.72	.83	.71	22.53
1950	1.05	2.87	1.78	1.03	.90	3.12	4.73	3.11	3.33	2.85	2.11	.89	27.11

Yearly discharge, in cubic feet per second

Year	U.S.F. no.	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1888	24	-	-	-	7,095	1.58	21.47	7,095	21.47
1889	24	-	-	-	7,476	1.66	22.61	7,476	22.61
1890	24	-	-	-	9,030	2.01	27.24	9,030	27.24
1891	24	-	-	-	7,922	1.76	23.79	7,922	23.79
1892	24	-	-	-	10,488	2.33	31.86	10,524	31.86
1893	24	-	-	-	7,506	1.67	22.63	7,528	22.63
1894	24	-	-	-	6,197	1.38	18.74	6,170	18.80
1895	24	-	-	-	8,716	1.27	17.21	6,346	19.13
1896	35	-	-	-	7,452	1.66	22.53	7,487	22.61
1897	35	31,080	July 15, 1897	2,180	8,974	1.99	27.11	9,352	28.27
1898	47	39,251	Mar. 14, 1898	1,153	8,415	1.87	25.40	7,987	24.04
1899	47	41,475	Apr. 26, 1899	304	7,128	1.56	21.32	6,625	19.97
1900	47	43,546	Apr. 23, 1900	713	7,058	1.57	21.11	6,770	20.17
1901	85	54,942	Apr. 24, 1901	1,377	7,214	1.80	21.84	7,544	22.94
1902	82	42,940	Mar. 16, 1902	1,400	98,940	61.88	926.07	69,034	827.36
1903	97	54,283	Mar. 25, 1903	1,047	9,322	2.07	27.70	9,160	27.63
1904	186	34,305	Apr. 11, 1904	705	6,890	61.88	926.07	69,034	827.36
1905	186	48,273	Apr. 1, 1905	-	98,661	41.82	486.07	68,711	826.24
1906	208	40,300	Apr. 16, 1906	197	6,890	61.88	925.59	7,910	23.67
1907	241	34,700	Apr. 11, 1907	872	7,910	51.59	621.69	69,020	827.31
1908	260	34,300	Apr. 21, 1908	973	9,710	2.18	27.59	7,900	23.13
1909	261	46,300	Apr. 16, 1909	235	7,090	1.56	21.23	7,050	21.13
1910	261	37,600	Apr. 3, 1910	345	6,650	1.48	20.04	6,900	20.90
1911	301	26,200	May 3, 1911	333	4,760	1.06	14.36	6,190	18.67
1912	321	47,275	Apr. 8, 1912	429	7,350	1.74	23.66	7,950	24.08
1913	331	130,000	Mar. 29, 1913	187	8,470	81.67	625.47	6,377	622.35
1914	331	64,185	Apr. 23, 1914	424	6,650	61.88	925.59	6,900	20.90
1915	401	33,193	Feb. 25, 1915	755	7,050	1.54	19.24	7,797	20.53
1916	431	36,945	Apr. 2, 1916	862	7,680	1.74	23.75	7,700	23.26
1917	481	36,945	June 13, 1917	899	7,050	1.57	21.31	7,010	21.16
1918	471	38,800	Apr. 3, 1918	576	6,210	1.38	18.71	7,010	21.13
1919	601	31,600	Apr. 13, 1919	1,360	6,680	1.55	19.61	6,900	20.90
1920	601	34,100	Apr. 6, 1920	1,080	7,160	1.69	21.80	7,280	22.04
1921	521	38,000	Mar. 22, 1921	715	6,890	1.52	20.61	6,140	18.53
1922	541	37,900	Apr. 15, 1922	725	6,450	1.58	19.59	7,750	23.70
1923	561	33,700	Apr. 9, 1923	743	5,710	1.27	17.23	6,500	19.57
1924	561	39,600	Apr. 19, 1924	820	7,640	1.70	23.10	7,440	22.53
1925	601	44,300	Mar. 30, 1925	636	7,510	1.67	22.63	6,700	20.21
1926	621	51,600	Apr. 28, 1926	895	7,760	1.72	23.41	7,290	21.35
1927	641	35,000	Mar. 21, 1927	613	6,310	1.40	19.36	7,940	24.03
1928	661	70,000	Nov. 4, 1927	933	9,950	2.21	30.13	7,460	22.34
1929	681	60,000	Mar. 29, 1929	665	7,720	1.72	23.27	7,900	23.80
1930	696	55,600	Apr. 6, 1930	808	8,990	1.53	18.08	8,650	17.06
1931	716	24,300	July 27, 1931	614	4,240	0.945	12.77	7,500	15.06
1932	726	27,700	Apr. 12, 1932	670	6,700	1.49	20.33	5,800	23.15
1933	746	24,300	Apr. 13, 1933	1,420	6,020	1.30	18.60	6,800	20.90
1934	754	24,400	Apr. 12, 1934	1,570	5,873	1.31	17.71	5,621	17.87
1935	761	29,600	Jan. 10, 1935	1,120	7,095	1.58	21.43	7,761	23.49

## HUDSON RIVER BASIN

Yearly discharge, in cubic feet per second, of Hudson River at Mechanicsville, N. Y.--Continued

Year	U.S.P. no.	Water year ending Sept. 30					Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1936	801	72,700	Mar. 19, 1936	1,500	7,759	1.72	23.46	7,711
1937	821	28,500	May 16, 1937	1,780	7,889	1.75	23.80	7,719
1938	851	65,600	Sept. 22, 1938	1,670	7,003	1.58	21.14	7,473
1939	871	33,800	Apr. 29, 1939	1,060	7,519	1.67	22.71	8,284
1940	891	40,100	Mar. 31, 1940	1,320	6,282	1.40	19.01	7,062
1941	921	22,600	Dec. 31, 1940	896	4,898	1.09	14.78	4,274
1942	951	27,100	Apr. 8, 1942	843	5,616	1.25	16.96	6,705
1943	971	35,100	May 13, 1943	2,050	8,890	1.98	26.80	8,171
1944	1001	32,800	Apr. 29, 1944	1,060	6,413	1.43	19.41	6,146
1945	1031	32,600	Mar. 22, 1945	1,170	6,113	1.80	24.46	10,040
1946	1051	31,500	Mar. 9, 1946	1,070	8,210	1.82	24.75	6,448
1947	1061	40,700	June 4, 1947	1,070	9,145	2.03	27.58	8,826
1948	1111	40,100	Mar. 23, 1948	6,245	1,339	1.39	18.25	6,488
1949	1142	34,400	Dec. 31, 1948	886	6,657	1.48	20.07	6,654
1950	1171	27,000	Apr. 5, 1950	1,640	7,124	1.58	21.50	-

Note.--Monthly figures of discharge per square mile and runoff, in inches, since October 1899, previously published in water-supply papers, may be subject to considerable error because of diversions, and storage and evaporation in Indian Lake since 1899, and in Sacandaga Reservoir since Mar. 27, 1935. These figures are not published herein.

## 62. Black River Canal (flowing south) near Boonville, N. Y.

Location.--Lat 43°27'20", long 75°19'25". gage 1 on left bank at lock 69, 2 miles south of Boonville, Oneida County, and gage 2 on right bank of Lansingkill spillway, 100 ft downstream from spillway headgates, 600 ft upstream from lock 70, and half a mile upstream from lock 69.

Gage.--Two water-stage recorders and concrete controls. Datum of gage 1 is 1,105.56 ft above mean sea level, datum of gage 2 is 1,105.56 ft above mean sea level. Prior to June 7, 1929, station was operated as a slope station on summit level of canal. September 1915 to September 1942 station was operated only during canal season.

Extremes.--1915-50: Maximum daily discharge recorded, 323 cfs Nov. 30, 1915; practically no flow at times when no water is being diverted.

Remarks.--Records include combined flow at gages 1 and 2 and represents total diversion from Black River at Forestport, through Forestport feeder, into Delta Reservoir in Mohawk basin. Discharge during periods when no water was diverted is made up of leakage through headgates and runoff from area draining into canal above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1915	230	284	-	-	-	-	-	-	-	230	208	210	220
1916	210	225	-	-	-	-	-	-	-	189	183	173	169
1917	176	182	-	-	-	-	-	-	-	177	154	161	156
1918	137	131	-	-	-	-	-	-	-	-	176	164	169
1919	184	-	-	-	-	-	-	-	-	-	151	156	118
1920	164	-	-	-	-	-	-	-	-	144	164	156	158
1921	156	-	-	-	-	-	-	-	-	-	123	142	144
1922	195	-	-	-	-	-	-	-	-	-	84.6	87.7	129
1923	141	-	-	-	-	-	-	-	-	-	111	108	109
1924	175	-	-	-	-	-	-	-	-	-	47.8	40.8	37.6
1925	35.7	-	-	-	-	-	-	-	-	108	151	161	153
1926	130	-	-	-	-	-	-	-	-	-	97.5	93.9	87.3
1927	-	-	-	-	-	-	-	-	-	25.5	51.7	68.1	65.7
1928	-	-	-	-	-	-	-	-	-	-	34.7	19.7	7.30
1929	-	-	-	-	-	-	-	-	-	29.9	54.9	64.5	51.1
1930	4.00	-	-	-	-	-	-	-	-	-	-	-	-
1931	96.1	-	-	-	-	-	-	12.5	24.8	20.4	49.2	72.5	-
1932	84.1	-	-	-	-	-	-	-	-	-	30.5	38.0	-
1933	47.3	-	-	-	-	-	-	-	-	-	76.4	99.2	121
1934	139	-	-	-	-	-	-	-	-	-	52.4	56.3	62.6
1935	-	-	-	-	-	-	-	-	-	-	31.1	50.4	60.5
1936	57.8	63.0	-	-	-	-	-	-	30.1	41.9	45.6	51.3	-
1937	89.4	-	-	-	-	-	-	-	16.8	33.6	56.8	67.4	-
1938	69.2	-	-	-	-	-	-	-	28.0	42.3	42.6	51.9	-
1939	56.5	-	-	-	-	-	-	-	49.9	52.0	51.4	54.6	-
1940	42.3	-	-	-	-	-	-	-	30.5	39.4	42.9	14.2	-
1941	62.5	-	-	-	-	-	-	-	43.0	44.7	53.5	53.0	56.2
1942	62.7	-	-	-	-	-	-	-	9.2	44.3	48.2	55.3	61.4
1943	27.3	34.2	9.60	4.86	4.24	14.5	16.8	12.6	34.2	47.7	55.7	55.7	25.8
1944	62.3	17.1	6.11	2.08	1.81	97.6	16.0	4.29	36.5	21.0	18.1	29.2	19.8
1945	26.7	12.6	4.76	6.02	4.96	16.2	15.6	25.0	14.9	54.3	57.3	48.6	26.3
1946	22.4	9.32	4.86	5.71	5.48	12.1	4.29	7.50	16.5	22.8	23.8	29.8	14.0
1947	44.9	12.8	1.16	.95	.61	12.8	1.48	1.29	1.28	7.08	6.46	61.7	12.0
1948	72.0	60.7	4.20	1.88	4.17	12.4	3.82	35.7	36.1	44.1	58.3	64.8	38.0
1949	43.9	50.3	1.85	1.73	1.86	1.47	1.64	27.0	83.1	62.5	62.2	76.3	34.6
1950	62.1	37.8	1.75	1.93	1.05	2.16	4.26	8.35	19.0	33.2	24.7	42.0	21.7

## 63. Delta Re

Location.--Lat 43°16'20", long 75°25' Nohawk River 4 miles upstream from

Drainage area.--145 sq mi.

Gage.--Staff gage. Datum of gage is

Remarks.--Dam completed Aug. 3, 1912; able began May 1, 1913. Reservoir is 2,800,000 cu ft. Reservoir is in

Cooperation.--Records not previously State Department of Public Works.

## Contents, in million

Water year	Oct.	Nov.	Dec.	Jan.	Feb.
1913	-	-	-	-	-
1914	542	1,470	1,980	2,120	-
1915	1,470	1,759	1,718	1,930	-
1916	2,482	2,493	1,804	854	-
1917	1,495	2,290	1,872	1,000	-
1918	2,660	1,782	1,334	1,004	-
1919	1,900	2,205	1,705	1,873	-
1920	2,848	2,770	2,273	962	-
1921	1,282	2,180	2,806	2,728	-
1922	1,920	2,312	839	1,136	-
1923	2,020	1,985	1,422	1,370	-
1924	2,145	2,186	1,100	22	-
1925	2,188	2,135	1,995	1,110	-
1926	3	4	1	2	-
1927	2,334	2,890	1,466	530	-
1928	1,718	2,926	2,608	2,804	-
1929	1,955	1,905	1,780	1,288	-
1930	1,145	1,229	1,714	1,310	-
1931	1,286	1,274	1,330	1,120	-
1932	2,045	2,383	2,818	2,740	-
1933	2,684	2,686	2,462	2,170	-
1934	1,821	2,155	2,175	1,532	-
1935	1,544	2,908	1,978	1,480	-
1936	1,885	2,608	2,322	1,354	-
1937	1,885	2,515	2,872	2,341	-
1938	2,120	2,842	2,405	1,723	-
1939	1,134	624	11	884	-
1940	1,114	890	1,013	780	-
1941	1,406	2,000	2,950	1,456	-
1942	2,100	1,462	1,504	1,331	-
1943	2,438	2,559	2,312	1,753	-
1944	2,383	2,372	1,466	1,120	-
1945	1,895	1,596	1,878	1,198	-
1946	2,225	2,130	1,576	1,514	-
1947	2,339	2,320	2,045	2,342	-
1948	1,426	1,358	1,100	1,203	-
1949	1,162	1,940	2,356	1,878	-
1950	1,615	1,746	2,427	2,484	-

## 64. Mohawk River

Location.--Lat 43°15'50", long 75°1' 1 mile downstream from Delta Dam

Drainage area.--150 sq mi.

Gage.--Water-stage recorder. Datum (datum). Prior to Jan. 24, 1937.

Average discharge.--29 years (1921-

Remarks.--1927-50: Maximum discharge, 30 cfs Sept. 27, 1942; minimum, 0 cfs Jan. 17, 1931.

Remarks.--During canal navigation: Forestport feeder and Black River station (see p. 82). Flow almost station). Small quantity of water and later returned to river, per

Cooperation.--Records for 1921-27, furnished by State engineer and sur-



APPENDIX D  
STABILITY COMPUTATIONS



### Structural Stability Analysis - Conditions Analyzed

- Condition 1: Normal conditions with water level at spillway crest elevation
- Condition 2: Water level at spillway crest with ice load of 5,000 lb/ft.
- Condition 3: Water level at elevation of assumed maximum flood (59.7BCD);  
flow depth of 11.7 feet over spillway
- Condition 4: Water level at elevation of one-half PMF (64.6BCD) flow depth  
of 16.6 feet over spillway.

# LOCK 2 AT MECHANICVILLE

## NY 988

### STABILITY ANALYSIS PROGRAM - WORK SHEET

#### INPUT ENTRY

#### ANALYSIS CONDITION

		1	2	3	4	5
Unit Weight of Dam (K/ft <sup>3</sup> )	0	0.15	0.15	0.15	0.15	0.15
Area of Segment No. 1 (ft <sup>2</sup> )	1	81.2	81.2	81.2	81.2	81.2
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2	26.8	26.8	26.8	26.8	26.8
Area of Segment No. 2 (ft <sup>2</sup> )	3	56.8	56.8	56.8	56.8	56.8
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4	22.0	22.0	22.0	22.0	22.0
Area of Segment No. 3 (ft <sup>2</sup> )	5	56.0	56.0	56.0	56.0	56.0
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6	15.0	15.0	15.0	15.0	15.0
Base Width of Dam (Total) (ft)	7	29.5	29.5	29.5	29.5	29.5
Height of Dam (ft)	8	15.0	15.0	15.0	15.0	15.0
Ice Loading (K/L ft.)	9	—	5	—	—	—
Coefficient of Sliding	10	0.6	0.6	0.6	0.6	0.6
Unit Weight of Soil (K/ft <sup>3</sup> ) (deduct 18)	11	0.055	0.055	0.055	0.055	0.055
Active Soil Coefficient - Ka	12	0.33	0.33	0.33	0.33	0.33
Passive Soil Coefficient - Kp	13	3.0	3.0	3.0	3.0	3.0
Height of Water over Top of Dam or Spillway (ft)	14	—	—	16.6	11.7	—
Height of Soil for Active Pressure (ft)	15	—	—	—	—	—
Height of Soil for Passive Pressure (ft)	16	—	—	—	—	—
Height of Water in Tailrace Channel (ft)	17	2.4	2.4	2.4	2.4	2.4
Weight of Water (K/ft <sup>3</sup> )	18	0.624	0.624	0.624	0.624	0.624
Area of Segment No. 4 (ft <sup>2</sup> )	19	25.0	25.0	25.0	25.0	25.0
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20	5.0	5.0	5.0	5.0	5.0
Height of Ice Load or Active Water (ft) (does not include 14)	46	15.0	15.0	15.0	15.0	15.0
Seismic Coefficient (g)	50	—	—	—	—	0.1
<b>RESULTS OF ANALYSIS</b>						
Factor of Safety vs. Overturning	2.01	1.63	1.48	1.60	1.65	
Distance From Toe to Resultant (ft)	19.63	15.17	12.70	14.75	15.44	
Factor of Safety vs. Sliding	1.46	0.85	0.45	0.57	0.93	

APPENDIX E

REFERENCES

# REFERENCES

- 1) US Army Corps of Engineers; New York District; Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models, October 1976.
- 2) US Geological Survey; Compilation of Records of Surface Waters of the United States, Part 1-B North Atlantic Slope Basins;

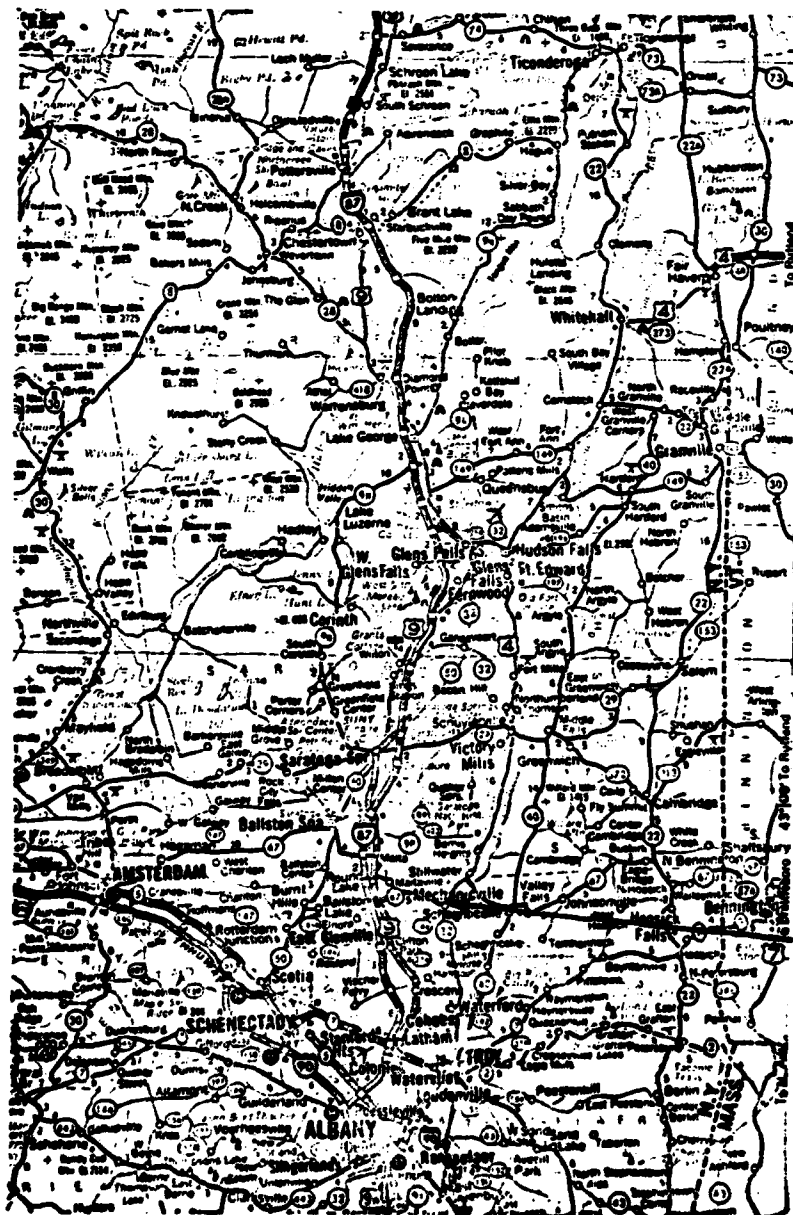
Water Supply Paper 1302 (Through September 1950), 1960.

Water Supply Paper 1722 (October 1950 to September 1960), 1964.

- 3) H.W. King and E.F. Brater; Handbook of Hydraulics, 5th edition, McGraw - Hill, 1963.
- 4) E.E. Seelye; Design, 3rd edition, John Wiley and Sons, Inc., 1960.
- 5) University of the State of New York; Geology of New York, Education Leaflet 20, Reprinted 1973.
- 6) U.S. Department of the Interior, Bureau of Reclamation; Design of Small Dams, 2nd edition (rev. reprint), 1977.

APPENDIX F

DRAWINGS



DAM SITE

VICINITY MAP

LOCK 2 DAM @ MECHANICVILLE

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK  
CONSERVATION COMMISSION  
ALBANY

~~Lock 2~~  
Lock 2

DAM REPORT

Sheet 2:25  
N. 132 UH

(Date)

191

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Mechanichville Dam Dam.

This dam is situated upon the Hudson River  
(Give name of stream)  
in the Town of Mechanichville, Saratoga County,  
about 1/2 mile  
(State distance) from the Village or City of Mechanichville.

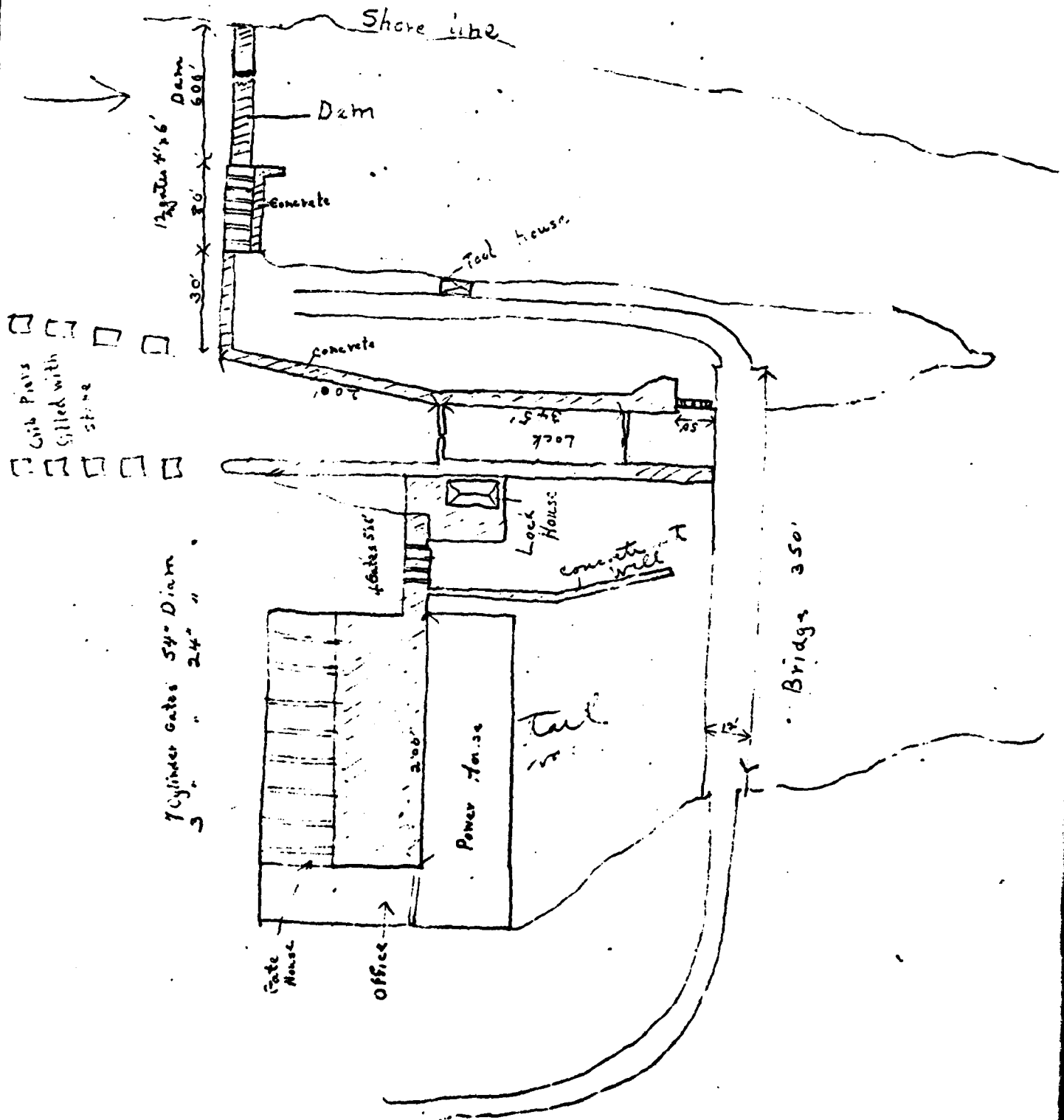
The distance up stream from the dam, to the Mechanichville Bridge,  
(Up or down) (Give name of nearest important stream or of a bridge)  
is about 1 1/2 miles  
(State distance) D P Wicks.

The dam is now owned by Albany Electric Power Corporation, Glen Falls  
(Give name and address in full) N.Y.  
and was built in or about the year 1899, and was extensively repaired or reconstructed  
during the year.....

As it now stands, the spillway portion of this dam is built of concrete  
(State whether of masonry, concrete or timber)  
and the other portions are built of concrete  
(State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion  
of the dam is rock and under the remaining portions such  
foundation bed is rock.

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)



The total length of this dam is 600 feet. The spillway or waste-weir portion, is about 600 feet long, and the crest of the spillway is about          feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: 12 gates (4x6) 4 gates (5x6)  
7 large cylinder head gates 54" diam, 3 cylinder head gates 24" diam.

At the time of this inspection the water level above the dam was 1 ft.          in.  
**below**  
**above** the crest of the spillway.

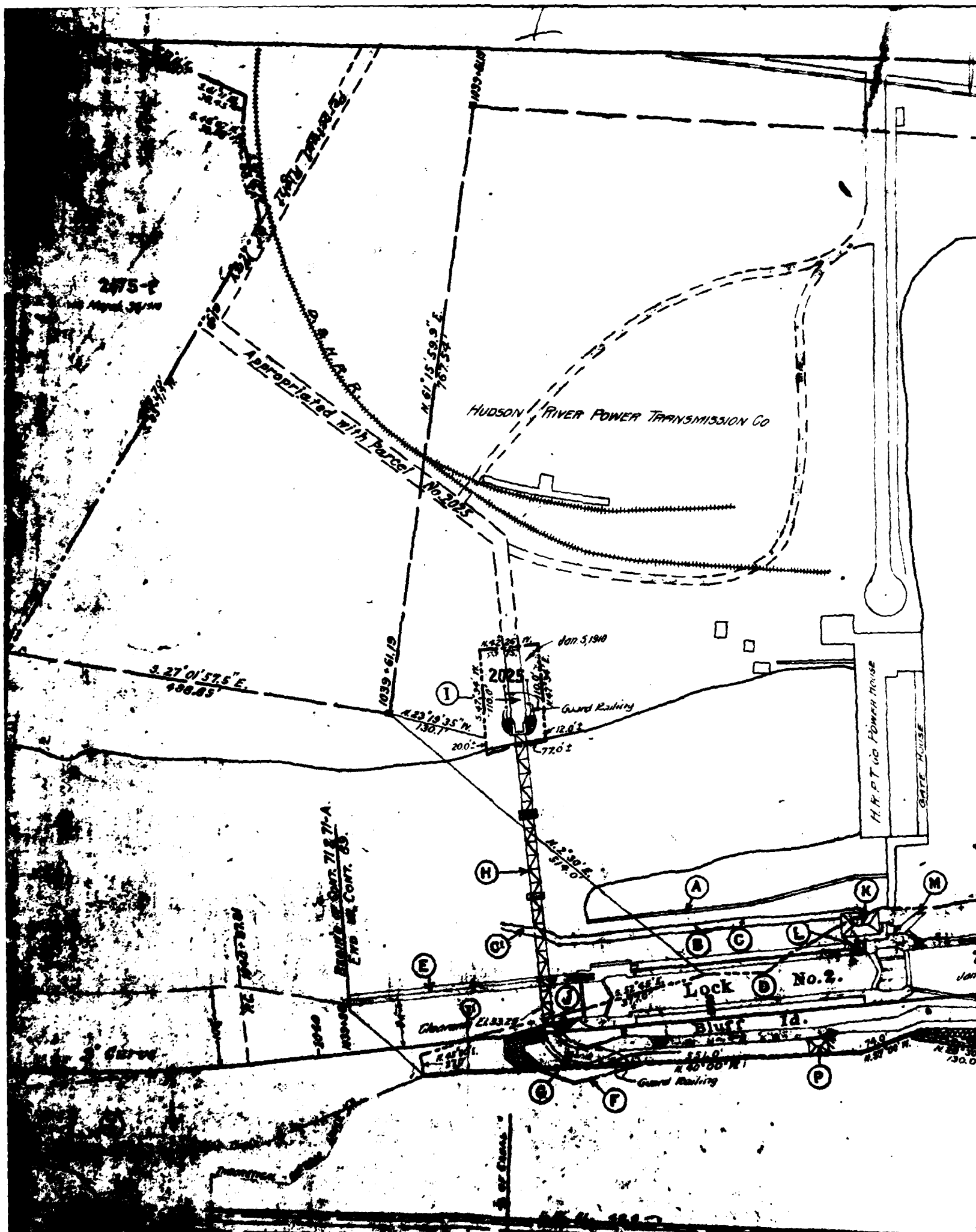
(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

*Dam is in good condition.*

Reported by Charles A. Pundhon  
(Signature)

110 Stadium Pl  
(Address—Street and number, P. O. Box or R. F. D. route)

Lyons, N.Y.  
(Name of place)



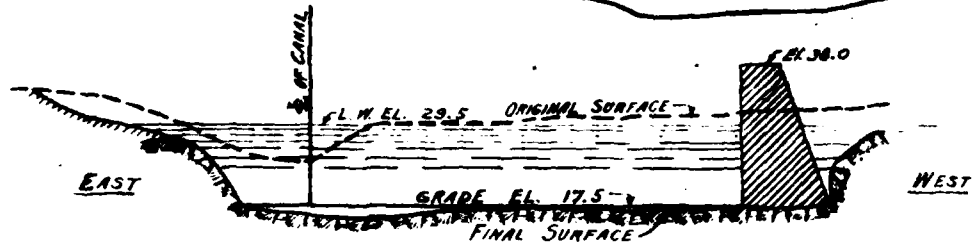
2

HUDSON VALLEY WATERFORD AND WHITEHALL  
S. 33° 11' 51.9" E. 2439.74' R. R. MONUMENTED BASE LINE

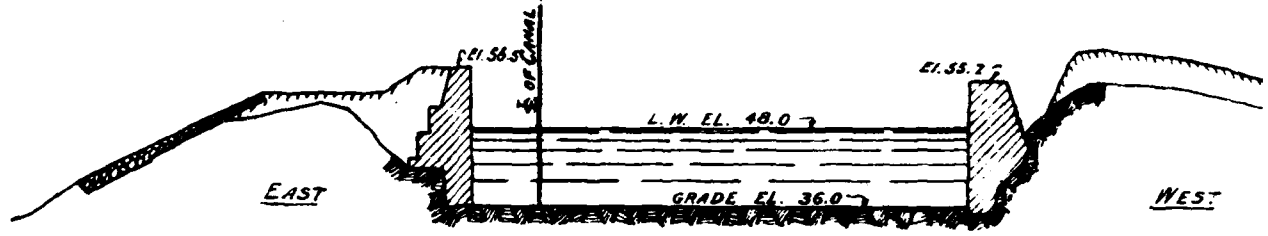
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M O N

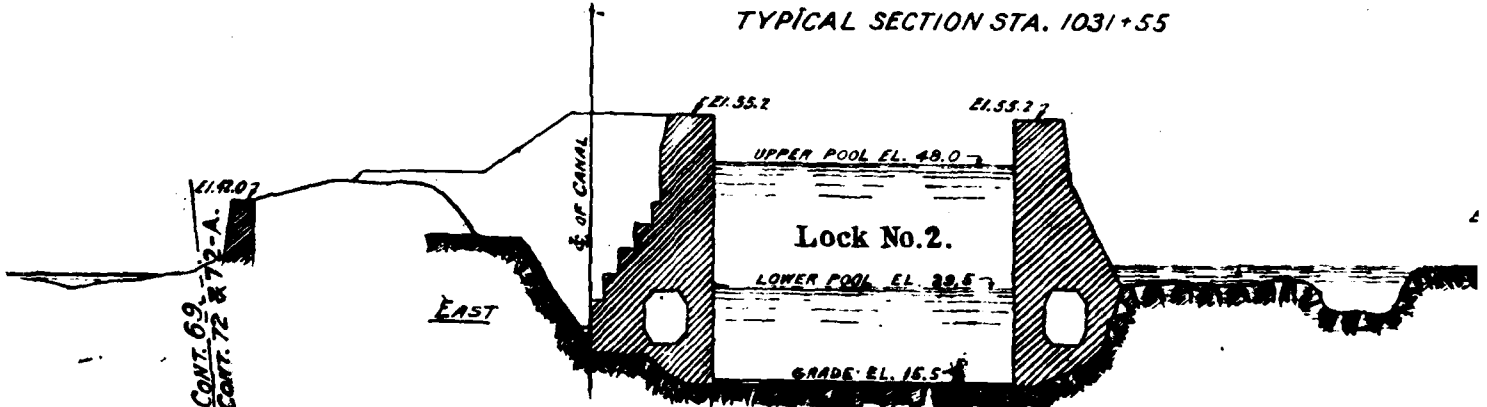
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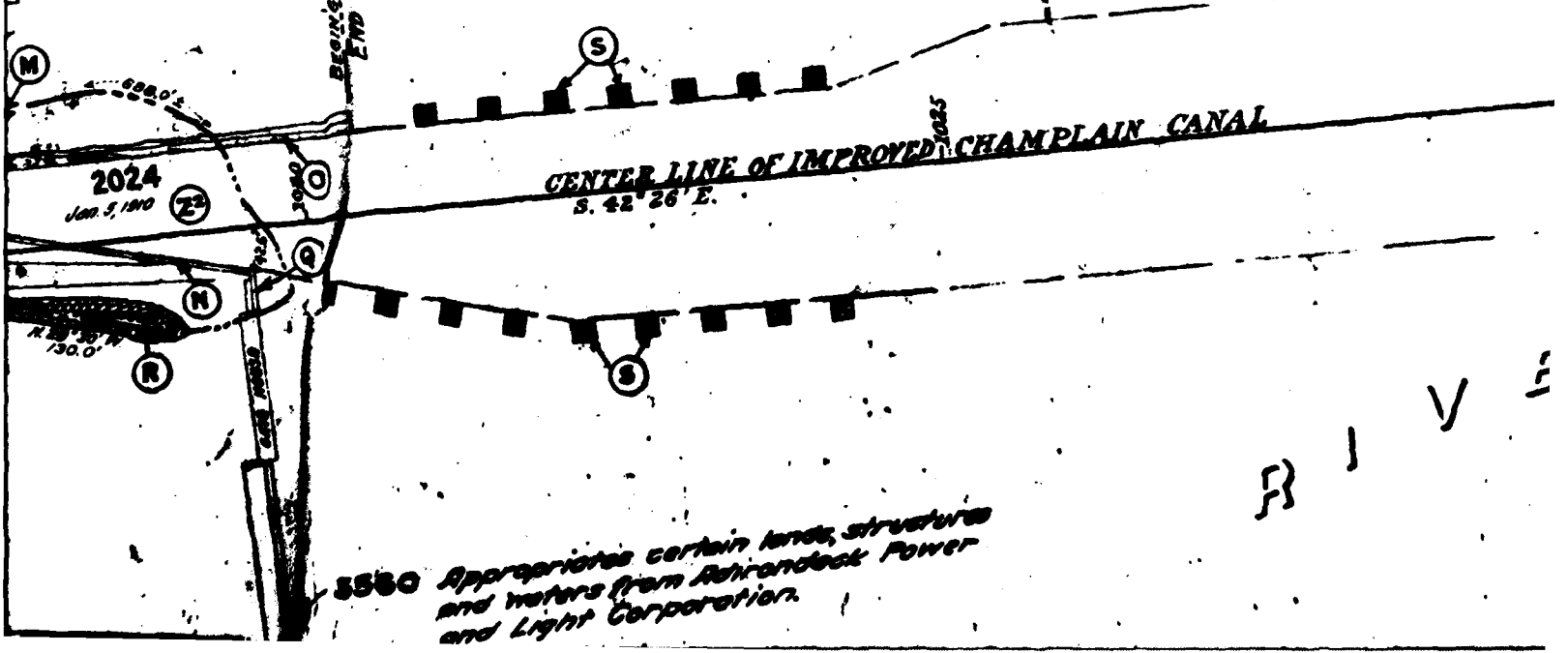
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TYPICAL SECTION STA. 1031+55



TYPICAL SECTION STA. 1035+50



ALL TURNPIKE  
LINE

WEST

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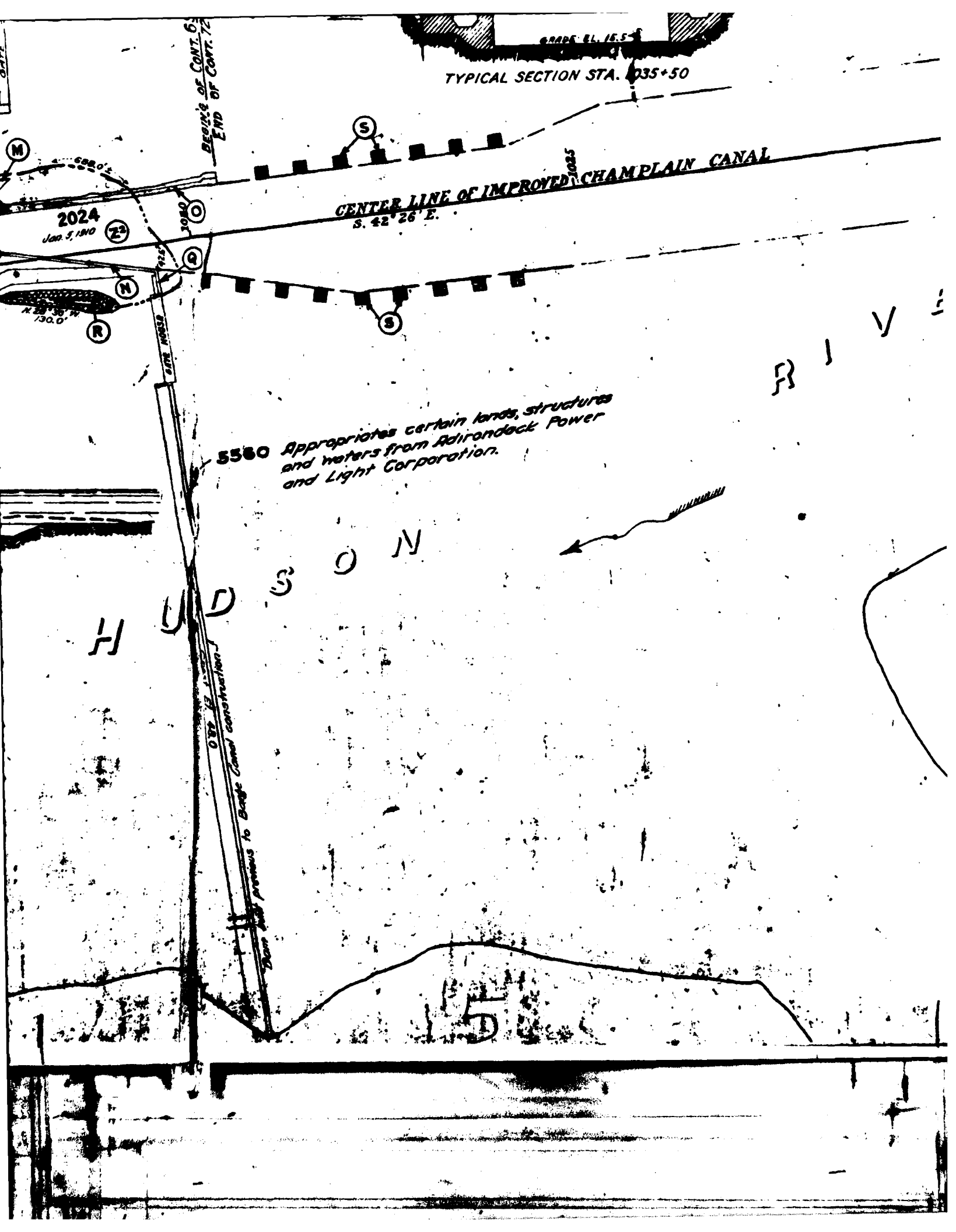
WEST

THEORETICAL BOTTOM ANGLE

2° Curve

Contract N°	Description
M62-10	Guide Railing





TYPICAL SECTION STA. 1035+50

CENTER LINE OF IMPROVED CHAMPLAIN CANAL  
S. 42° 26' E.

2024

Jan. 5, 1910

BEGINNING OF CONT. 6  
END OF CONT. 72

5580 Appropriates certain lands, structures  
and waters from Adirondack Power  
and Light Corporation.

H U D S O N

DAM AND PROMISE TO BUILD CANAL CONSTRUCTION

1015

2° Curve

1020

73

100

P.T. 1017+35.62

Contract N°	Description
MG2-10	Guide Railing

V E R

Quack Island

# Barge Canal STATE OF NEW YORK

Map showing location of channel, structures, associated lands and terminals of the Erie, Champlain, Oswego, and Cayuga and Seneca Canals, as improved under Chapter 147, Laws of 1903, Chapter 387, Laws of 1904, Chapter 748, Laws of 1905, and amendatory Laws.

Eastern Division

Champlain Canal

Section 1

Sta. 1040+00 to Sta. 1045+00

1

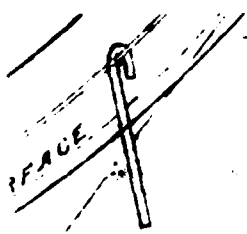
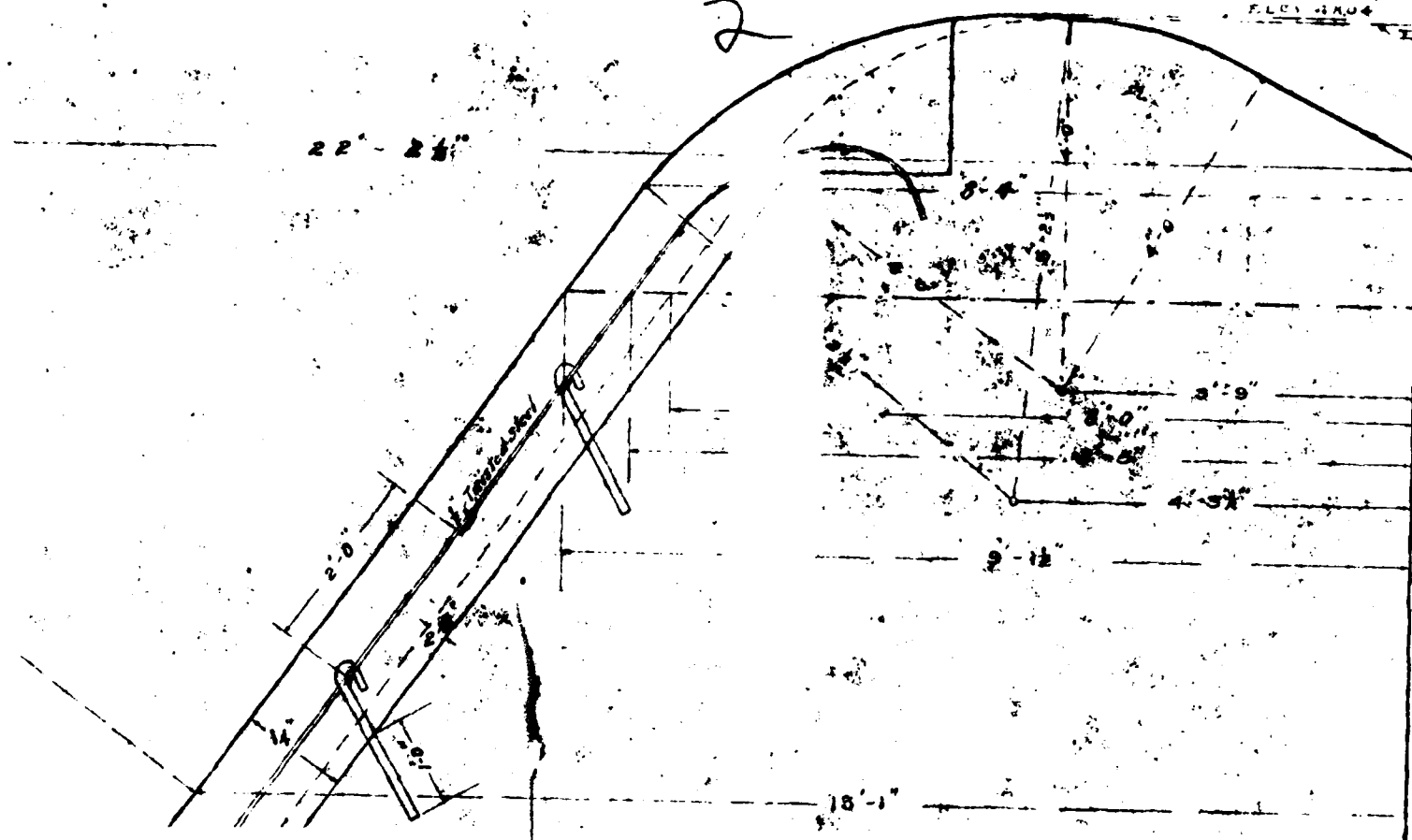
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ORIGINAL

SECTI

2

22' - 24'



ELEVATION.

FOR H.R.  
CHAMBERLAIN  
Aug 4, 1901  
Scale 1/4" = 1'

LEV 41

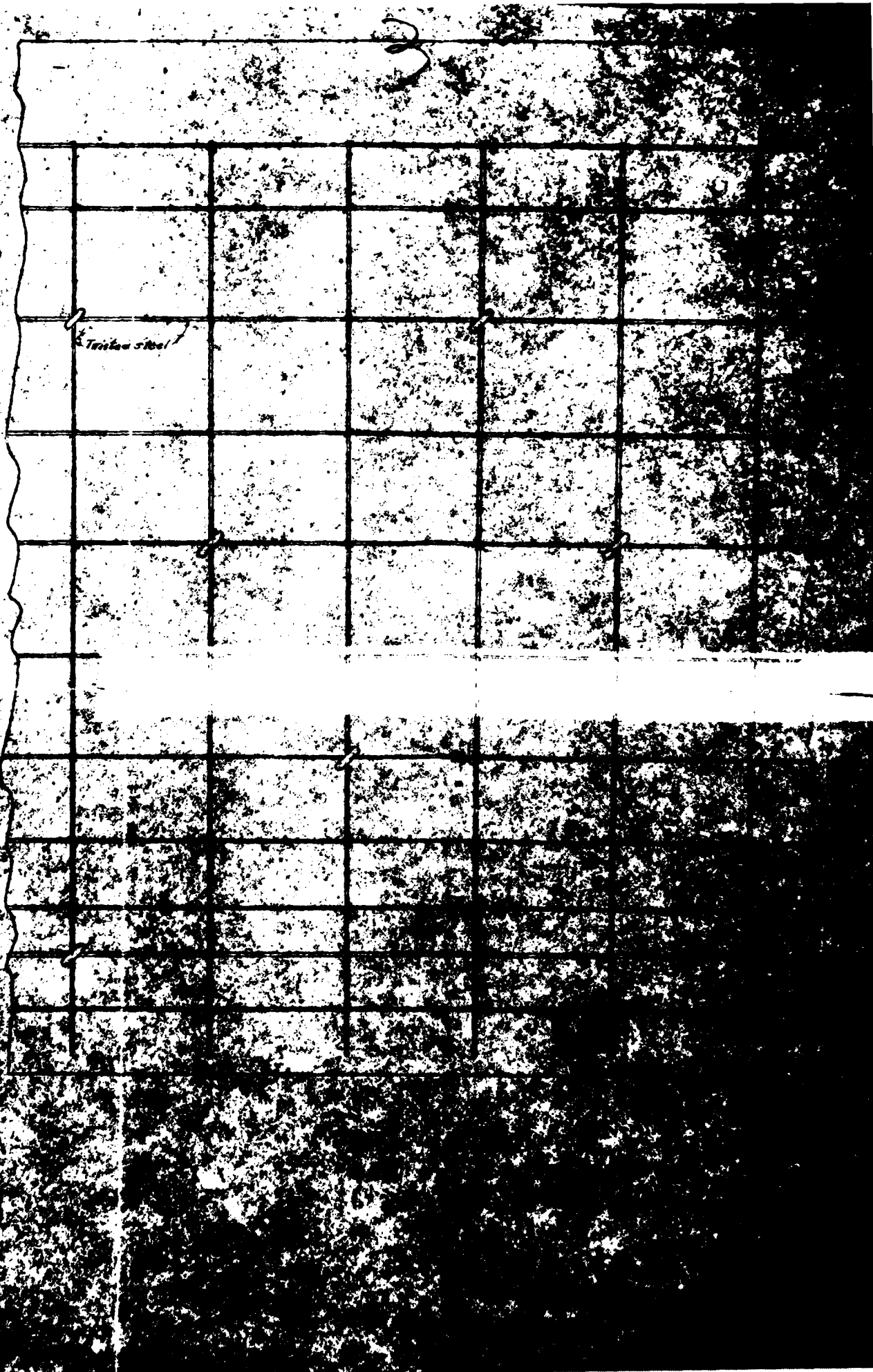
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END

DATE  
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11-80

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